

EMERGING TELECOMMUNICA- TIONS TECHNOLOGIES ACT

HEARING

BEFORE THE

SUBCOMMITTEE ON COMMUNICATIONS

OF THE

COMMITTEE ON COMMERCE,
SCIENCE, AND TRANSPORTATION
UNITED STATES SENATE

ONE HUNDRED FIRST CONGRESS

SECOND SESSION

ON

S. 2904

TO REQUIRE THE SECRETARY OF COMMERCE TO MAKE ADDITIONAL
FREQUENCIES AVAILABLE FOR COMMERCIAL ASSIGNMENT IN ORDER
TO PROMOTE THE DEVELOPMENT AND USE OF NEW TELECOM-
MUNICATIONS TECHNOLOGIES, AND FOR OTHER PURPOSES

AUGUST 2, 1990

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EMERGING TELECOMMUNICATIONS TECHNOLOGIES ACT OF 1990

THURSDAY, AUGUST 2, 1990

U.S. SENATE,
COMMITTEE ON COMMERCE, SCIENCE, AND TRANSPORTATION,
SUBCOMMITTEE ON COMMUNICATIONS,
Washington, DC.

The subcommittee met, pursuant to notice, at 2:35 p.m., in room SR-253, Russell Senate Office Building, Hon. Daniel K. Inouye (chairman of the subcommittee) presiding.

Staff members assigned to this hearing: John Windhausen and Tom Cohen, staff counsels; Gina Keeney and William Heyer, minority staff counsels.

OPENING STATEMENT BY SENATOR INOUE

Senator INOUE. This afternoon we meet to consider S. 2904, the Emerging Telecommunications Technologies Act of 1990. This measure will direct the Secretary of Commerce to take 200 megahertz of spectrum away from the Federal Government and make it available to commercial users and local governments for the development of new telecommunications technologies. The bill also makes several proposals for improving our spectrum allocation process.

The purpose of this hearing is to examine this bill and to determine whether it is ready for action by the Senate this year. The issues surrounding the radio frequency spectrum are among the most fundamental in communications policy-making. The spectrum is a unique natural resource. It cannot be used up and requires no Federal funding to maintain.

The challenge for policymakers is not maintenance but management.

Until recently, however, the United States has not devoted sufficient resources to ensure that our spectrum is managed effectively. Too often, for instance, the U.S. has allocated spectrum on an ad hoc basis with no long-range planning. Our Nation has tended to award spectrum rights generously with little oversight of actual use. Spectrum owners have had little need or incentive to use their spectrum efficiently.

Further, many of the decisions to allocate spectrum to the Federal Government were made 20 or 30 years ago. These allocations do not recognize the virtual explosion in technology and demand for new services that depend upon commercial spectrum availability.

S. 2904 addresses many of these programs and problems in a constructive way. By reallocating 200 megahertz of spectrum to commercial and local government use, this measure recognizes that the U.S. must take action to promote the development of new technologies before we lose our world lead in the communications industry. Our commercial success should not be dependent upon antiquated spectrum allocation rules.

Of course we must recognize that reallocating spectrum can involve tremendous cost. It may be unfair to move users to a different part of the spectrum when that transfer may require the investment of millions of dollars in new equipment. The bill also recognizes that the U.S. must do a better job of promoting efficient spectrum use in the future.

For one, the U.S. must engage in better long-range planning, rather than allocating spectrum on an ad hoc basis with no long-range plan. This bill, thus, directs the Secretary to set up an advisory committee to recommend changes to the spectrum allocation process.

The United States must also give those who use the spectrum greater incentives to use that spectrum efficiently. Neither government nor commercial interests should be permitted to warehouse frequencies if they are not using those frequencies to serve the public good.

This afternoon's hearing gives us the opportunity to hear from a broad array of witnesses, who have direct experience with the radio spectrum. We will hear first from the two government agencies that are directly responsible for administering the spectrum, Ms. Janice Obuchowski, Administrator of the National Telecommunications and Information Administration; and Dr. Thomas Stanley, Chief Engineer for the Federal Communications Commission.

We will then hear directly from Lieutenant General James Casity, who will testify as to our Armed Forces' continued need for adequate frequencies. The Tennessee Valley Authority will also testify as to the need for some non-military, Federal Government users to retain control of their spectrum for the purpose of providing essential public services. We will then hear from a variety of representatives of the private sector and local government.

And I look forward to the testimony of all these witnesses, and I expect that a group of experts gathered here today will present us with very important ideas and suggestions that hopefully will help us to move forward on this bill in the near future.

Senator Gore.

OPENING STATEMENT BY SENATOR GORE

Senator GORE. Thank you very much, Mr. Chairman.

This is an important issue, and I am pleased that you are holding this hearing. I will not be able to attend the entire hearing, and I wish to apologize to the witnesses who I will not be able to hear, but as you know very well, Mr. Chairman, because of your duties on the appropriations defense subcommittee, our armed services committee bill is on the floor, and I have a number of measures which will require my attendance there.

But I am following this hearing very closely. This issue is one of great interest to me. And I will, at the appropriate time, ask that my entire statement be placed in the record of this hearing.

I want to just briefly note one particular concern at this point, because it is a serious concern, which I hope the committee will deal with before placing this legislation on the track. The goal of better utilizing the radio spectrum is unassailable. And there may be a great deal of unused or under-utilized government spectrum. However, this bill, if enacted, would create a huge burden for millions of electricity ratepayers in my home state of Tennessee and throughout the Tennessee Valley Authority service area.

I believe others on this committee will weigh in with similar concerns, in Kentucky and Mississippi, and also from Washington and Oregon, where the Bonneville Power Administration is affected. This would cost TVA ratepayers a minimum of \$25 million, and the impact would be, I think, unacceptable.

I look forward to reviewing the testimony of all the witnesses, and in particular, Mr. Chairman, I commend to you the statement of the TVA witnesses we will hear later today. I look forward to working with you and our colleagues to improve the bill to correct what I regard as at least one serious flaw.

One final point, Mr. Chairman. I would like to express a little concern that the Office of Management and Budget has apparently ordered TVA not to express certain viewpoints and requests of this subcommittee. And even though the electricity ratepayers of my state are likely to be affected by this matter, and the fiduciaries of their interest in that respect are here at our request to tell us of the effect on them as the ratepayers, and to offer suggestions on how we might mitigate that effect, as a matter of ideology or executive branch policy, they are ordered not to be fully candid in expressing their suggestions to us.

I want to register that concern because I do not think it is good public policy. I think it is very heavy-handed on the part of the Office of Management and Budget, and it is not appreciated by the electricity ratepayers in Tennessee. But I am quite confident of the ability of this subcommittee to ferret out exactly what those candid views might be, and hopefully respond to them.

And I appreciate the chance to work with you, Mr. Chairman, as always.

I am pleased to welcome to the subcommittee today Lou Grande and Dick Crawford of the Tennessee Valley Authority. Mr. Grande, who will be presenting TVA's testimony today, is the vice president for information services and Mr. Crawford is vice president for power transmission and customer services. We look forward to your testimony today, gentlemen.

The legislation before us today has the potential to be an important first step in ensuring that the United States will not be left behind as exciting new telecommunications innovations are arising and being implemented throughout the world.

However, as we consider taking steps—like those proposed in S. 2904—which will result in radio frequencies being taken away from Federal agencies that are using those frequencies to meet various important purposes, we must be equally mindful that we do not impair vital services currently being provided to the public.

In this regard, I would like to address the potential adverse effects that this legislation could have on the reliability of the Tennessee Valley Authority power system. I understand that Senator Ford shares these concerns. I also understand that Senators Packwood and Gorton have similar concerns with the bill's potential impacts on the Bonneville Power Administration.

Over 7 million people and businesses in the Tennessee Valley region, which includes virtually all of the State of Tennessee, parts of Kentucky and five other States, depend on the electricity furnished by the TVA power system to meet their electric power needs—lighting, heating, and cooling their homes, shops, offices, and schools; lighting their city streets; running their factories; and operating a host of appliances, equipment, and tools that enable them to carry out their day-to-day activities.

The Tennessee Valley Authority power system is unlike most other Federal programs because, since 1959, it has received no appropriations. Customers supplied with TVA power pay all of the TVA power system's cost and are the sole backers of TVA's debts—which by law are not obligations of or guaranteed by the Federal Government.

Since the people and businesses of the State of Tennessee are paying the bills, they have the right to expect that they will get the electricity they are paying for in a reliable manner—and I fully intend to ensure that the legislation before us today will not compromise their needs and expectations and the ability of the TVA power system to meet them.

In meeting the electric power needs of the Tennessee Valley region, the TVA power system owns 18 microwave facilities which operate on radio frequencies—currently assigned to TVA—that could be withdrawn under this legislation. TVA estimates the costs to move to another frequency to be a minimum of \$25 million.

It is through those microwave facilities that TVA sends the signals that communicate with, control, and protect TVA generation and transmission facilities; direct the flow of electric power over 17,000 miles of high-voltage transmission lines; communicate with repair crews in remote locations to restore power in emergency circumstances; and control power exchanges with neighboring electric systems through 44 interconnection points that help sustain the reliability of the Nation's eastern power grid, as well as power supply in the Tennessee Valley region.

Therefore, we're not addressing things like convenience or personal preferences when we focus on the needs of the TVA power system and the customers it serves—we're dealing with public safety and maintaining electric supply reliability.

Under no circumstances should the people and businesses served through the TVA power grid have to bear greater risks of power outages as a consequence of what we are considering here today. It is my intention to work to ensure that this legislation will in no way result in any reduction of the reliability of electric service in the Tennessee Valley region.

Senator INOUE. I thank you very much.

I have been requested by Senator Slade Gorton to submit his statement in the record.

And, with that statement there is an attachment, a letter to the Senator from the Northwest Public Power Association.
May I now call upon Senator Burns.

OPENING STATEMENT BY SENATOR BURNS

Senator BURNS. Thank you, Mr. Chairman. I want to thank you and congratulate you on the introduction of S. 2904, which will provide the needed radio spectrum for the development of new technologies and improving the national spectrum planning process.

I congratulate you for this piece of legislation. I think it is really something that goes back into the area of promoting not only competition but also opening up areas for new technologies in communications. So I applaud you for that.

Electromagnetic spectrum is a valuable natural resource vital to all communications services. Today, because of new communications services and technologies, there is an ever increasing demand for spectrum. The appetite for new spectrum space is not likely to be satisfied any time soon. Cellular phones, satellite dishes, wireless personal communications networks digital radio, high definition television, air phone and new cutting edge communications technologies yet to be discovered will create even greater demand for spectrum.

The limited amount of available spectrum raises serious concerns about the United States' competitiveness posture. Japan and European countries have recognized the value of spectrum in communications infrastructure modernization. These foreign competitors are setting aside large pieces of spectrum for use by companies developing new communications technologies.

Mr. Chairman, because of my strong agreement with the goals of S. 2904, I want to add my name as a co-sponsor of this forward-looking legislation. This spectrum legislation will remove an impediment to the introduction of new products, providing U.S. industries a greater ability to compete in international markets, and elevate the role of spectrum management thus resulting in more informed spectrum management policies.

I am, however, sensitive to the concerns raised by the Bush Administration. It is my great hope that we can work out a compromise which takes into account the Administration's concerns while making available additional spectrum for the private sector.

In particular, Mr. Chairman, while the House companion to S. 2904 was amended to remove the prohibition on spectrum auctions, what is needed is an explicit authorization to enable the FCC to use a competitive bidding process to assign licenses to use this new spectrum.

Auctions could benefit the public in three important ways.

First, they would significantly reduce the amount of private and public resources used in preparing and processing license applications.

Second, the auction, with relatively little administrative delay, places the license in the hands of the party who, as the highest bidder, values it the most and has the greatest incentive to implement the service quickly and operate it efficiently and in a manner

responsive to the public in order to recoup the amount of his bid as soon as possible.

Third, and most importantly, unlike the existing licensing schemes, auctions would give the American taxpayers an immediate financial return for the valuable privilege conferred in the grant of a license for spectrum use. President Bush's budget proposal for fiscal 1990 endorsed the auction idea, estimating \$3.4 billion in revenues over two years (that estimate does not include the new spectrum which this bill would make available).

Again, let me thank you, Mr. Chairman, for your able leadership on this important communications policy issue.

Senator INOUE. Thank you, Senator.

[The statement and bill follow:]

OPENING STATEMENT BY SENATOR GORTON

I look forward to hearing the witnesses testimony on the "Emerging Telecommunications Technologies Act". This legislation would require the Secretary of Commerce to identify 200 megahertz of the spectrum which would be transferred from the Federal government for use by the private sector.

The spectrum is a finite and extremely valuable resource. Its allocation must be made with careful planning and an eye toward tomorrow's needs. Those who use the spectrum must do so wisely. In this regard, I am pleased to note that the cellular telephone industry is doing its part. For instance, McCaw Communications in Kirkland, Washington is aggressively moving its transmissions from an analog format to the more efficient digital format.

Perhaps my greatest concern with this bill is how it will impact electric ratepayers in the Northwest. The Bonneville Power Administration provides the backbone of electric power transmission service for the entire Northwest. It is interconnected with over 100 electric utilities in a coordinated power grid that covers the entire western United States and Canada. Successful operation of this system is only possible through a dedicated, highly reliable telecommunications system.

I would like to ask that a letter which I have received from the Northwest Public Power Association be inserted in the record of today's proceedings. It explains the extreme importance of dedicated bands to the reliable operation of our electric utilities in the Northwest.

101ST CONGRESS
2D SESSION

S. 2904

To require the Secretary of Commerce to make additional frequencies available for commercial assignment in order to promote the development and use of new telecommunications technologies, and for other purposes.

IN THE SENATE OF THE UNITED STATES

JULY 25 (legislative day, JULY 10), 1990

Mr. INOUE introduced the following bill; which was read twice and referred to the Committee on Commerce, Science, and Transportation

A BILL

To require the Secretary of Commerce to make additional frequencies available for commercial assignment in order to promote the development and use of new telecommunications technologies, and for other purposes.

1 *Be it enacted by the Senate and House of Representa-*
2 *tives of the United States of America in Congress assembled,*

3 **SECTION 1. SHORT TITLE.**

4 This Act may be cited as the “Emerging Telecommuni-
5 cations Technologies Act of 1990”.

6 **SEC. 2. FINDINGS.**

7 The Congress finds that—

1 (1) the Government currently reserves for its own
2 use approximately 40 percent of the electromagnetic
3 spectrum that is assigned for use pursuant to the Com-
4 munications Act of 1934;

5 (2) many of the reserved frequencies are unused
6 by Government licensees;

7 (3) the public interest requires that many of the
8 reserved frequencies be utilized more efficiently by
9 government or commercial operators;

10 (4) additional frequencies are assigned for services
11 that could be obtained more efficiently from commercial
12 carriers or other vendors;

13 (5) scarcity of assignable frequencies for commer-
14 cial use can and will—

15 (A) impede the development and commercial-
16 ization of new telecommunications products and
17 services;

18 (B) reduce the capacity and efficiency of the
19 United States' telecommunications systems; and

20 (C) thereby adversely affect the productive
21 capacity and international competitiveness of the
22 United States economy;

23 (6) a reassignment of these frequencies can
24 produce significant economic returns; and

1 (7) the Secretary of Commerce, the President, and
2 the Federal Communications Commission should be di-
3 rected to take appropriate steps to correct these defi-
4 ciencies.

5 **SEC. 3. NATIONAL SPECTRUM PLANNING.**

6 (a) **PLANNING ACTIVITIES.**—The Assistant Secretary
7 for Communications and Information and the Chairman of
8 the Commission shall meet, at least biannually, to conduct
9 joint spectrum planning with respect to the following issues:

10 (1) the future spectrum requirements for public
11 and private uses;

12 (2) the spectrum allocation actions necessary to
13 accommodate those uses; and

14 (3) actions necessary to promote the efficient use
15 of the spectrum, including spectrum management
16 techniques to promote increased shared use of the
17 spectrum.

18 (b) **REPORTS.**—The Assistant Secretary for Communi-
19 cations and Information and the Chairman of the Commission
20 shall submit an annual report to the Committee on Energy
21 and Commerce of the House of Representatives, the Commit-
22 tee on Commerce, Science, and Transportation of the Senate,
23 the Secretary, and the Commission on the joint spectrum
24 planning activities conducted under subsection (a) and recom-
25 mendations for action developed pursuant to such activities.

1 The first annual report submitted after the date of the report
2 by the private sector advisory committee under section
3 4(d)(4) shall include an analysis of and response to that com-
4 mittee report.

5 **SEC. 4. IDENTIFICATION OF REALLOCABLE FREQUENCIES.**

6 (a) **IDENTIFICATION REQUIRED.**—The Secretary shall,
7 within 24 months after the date of the enactment of this Act,
8 prepare and submit to the President and the Congress a
9 report identifying, and recommending for reallocation, fre-
10 quencies that—

11 (1) are assigned to Government stations pursuant
12 to section 305(a) of the Act;

13 (2) are not required for the present or identifiable
14 future needs of the Government;

15 (3) it is or will be feasible to make available for
16 use under the Act (other than for Government stations
17 under such section 305); and

18 (4) are most likely to have the greatest potential
19 for commercial uses under the Act.

20 (b) **MINIMUM AMOUNT OF SPECTRUM RECOMMEND-**
21 **ED.**—

22 (1) **IN GENERAL.**—The report required by subsec-
23 tion (a) shall identify (and recommend for reallocation)
24 bands of frequencies that span a total of not less than
25 200 megahertz, that are located below 5 gigahertz,

1 and that offer frequencies meeting the criteria specified
2 in paragraphs (1) through (3) of subsection (a). If the
3 report identifies (as meeting such criteria) bands of fre-
4 quencies spanning more than 200 megahertz, the
5 report shall identify (and recommend for reallocation)
6 those bands (spanning not less than 200 megahertz)
7 that meet the criteria specified in paragraph (4) of such
8 subsection.

9 (2) MIXED USES PERMITTED TO BE COUNTED.—

10 Frequencies which the Secretary's report recommends
11 be partially retained for use by a Government station
12 within a geographically limited area, but which are
13 also recommended to be reallocated to be made avail-
14 able under the Act outside that area, may be counted
15 toward the minimum spectrum required by paragraph
16 (1) of this subsection, except that—

17 (A) the frequencies counted under this para-
18 graph may not count toward more than 20 per-
19 cent of the minimum required by paragraph (1) of
20 this subsection; and

21 (B) a frequency may not be counted under
22 this paragraph unless the geographically limited
23 area for which it will be retained for Government
24 use includes not more than 20 percent of the pop-
25 ulation of the United States.

1 (c) CRITERIA FOR IDENTIFICATION.—

2 (1) NEEDS OF THE GOVERNMENT.—In determin-
3 ing whether a frequency meets the criteria specified in
4 subsection (a)(2), the Secretary shall—

5 (A) consider whether the frequency is used to
6 provide a communications service that is or could
7 be available from a commercial carrier or other
8 vendor;

9 (B) seek to promote—

10 (i) the maximum practicable reliance on
11 commercially available substitutes;

12 (ii) the sharing of frequencies in geo-
13 graphically separate areas (as permitted
14 under subsection (b)(2));

15 (iii) the development and use of new
16 communications technologies; and

17 (iv) the use of nonradiating communica-
18 tions systems where practicable; and

19 (C) seek to avoid—

20 (i) serious degradation of Government
21 services and operations; and

22 (ii) excessive costs to civilian users of
23 Government services.

1 (2) **FEASIBILITY OF USE.**—In determining wheth-
2 er a frequency meets the criteria specified in subsection
3 (a)(3), the Secretary shall—

4 (A) assume such frequencies will be assigned
5 by the Commission under section 303 of the Act
6 over the course of not less than 15 years;

7 (B) assume reasonable rates of scientific
8 progress and growth of demand for telecommuni-
9 cations services;

10 (C) determine the extent to which the reallo-
11 cation or reassignment will relieve actual or po-
12 tential scarcity of frequencies available for com-
13 mercial use; and

14 (D) seek to include frequencies which can be
15 used to stimulate the development of new technol-
16 ogies.

17 (3) **COMMERCIAL USE.**—In determining whether
18 a frequency meets the criteria specified in subsection
19 (a)(4), the Secretary shall consider—

20 (A) the extent to which equipment is avail-
21 able that is capable of utilizing the frequency;

22 (B) the proximity of frequencies that are al-
23 ready assigned for commercial use; and

24 (C) the activities of foreign governments in
25 making frequencies available for experimentation

1 or commercial assignment in order to support
2 their domestic manufacturers of equipment.

3 (d) PROCEDURE FOR IDENTIFICATION OF REALLOCA-
4 BLE FREQUENCIES.—

5 (1) SUBMISSION OF PRELIMINARY IDENTIFICA-
6 TION TO CONGRESS.—Within 12 months after the date
7 of the enactment of this Act, the Secretary shall pre-
8 pare and submit to the Congress a report which makes
9 a preliminary identification of reallocable frequencies
10 which meet the criteria established by this section.

11 (2) CONVENING OF PRIVATE SECTOR ADVISORY
12 COMMITTEE.—Not later than the date the Secretary
13 submits the report required by paragraph (1) of this
14 subsection, the Secretary shall convene a private sector
15 advisory committee (A) to review the frequencies iden-
16 tified in such report, (B) to advise the Secretary with
17 respect to the frequencies which should be included in
18 the final report required by subsection (a) of this sec-
19 tion, (C) to receive public comment on the Secretary's
20 report and on the final report, and (D) to prepare and
21 submit the report required by paragraph (4) of this sub-
22 section. The private sector advisory committee shall
23 meet at least monthly until each of the actions required
24 by section 5(a) have taken place.

1 (3) COMPOSITION OF COMMITTEE.—The private
2 sector advisory committee shall be composed of repre-
3 sentatives of—

4 (A) United States manufacturers of spec-
5 trum-dependent telecommunications equipment;

6 (B) commercial carriers;

7 (C) other users of the electromagnetic spec-
8 trum, including radio and television licensees; and

9 (D) other interested members of the public
10 who are knowledgeable about the uses of the elec-
11 tromagnetic spectrum.

12 (4) RECOMMENDATIONS OF SPECTRUM ALLOCA-
13 TION PROCEDURES.—The private sector advisory com-
14 mittee shall, not later than 36 months after the date of
15 the enactment of this Act, submit to the Secretary, the
16 Commission, the Committee on Energy and Commerce
17 of the House of Representatives, and the Committee
18 on Commerce, Science, and Transportation of the
19 Senate, a report containing such recommendations as
20 the committee considers appropriate for the reform of
21 the process of allocating the electromagnetic spectrum
22 between civilian and Government use.

1 SEC. 5. WITHDRAWAL OF ASSIGNMENT TO GOVERNMENT
2 STATIONS.

3 (a) IN GENERAL.—Within 6 months after receipt of the
4 Secretary's report under section 4(a), the President shall—

5 (1) withdraw the assignment to a Government
6 station of any frequency which the report recommends
7 for reallocation;

8 (2) limit the assignment to a Government station
9 of any frequency which the report recommends be
10 made available for mixed use under section 4(b)(2);

11 (3) assign or reassign other frequencies to Gov-
12 ernment stations as necessary to adjust to such with-
13 drawal or limitation of assignments; and

14 (4) notify the Commission and each House of
15 Congress of the actions taken under this subsection.

16 (b) EXCEPTIONS.—

17 (1) AUTHORITY TO SUBSTITUTE.—If the Presi-
18 dent determines that a circumstance described in para-
19 graph (2) exists, the President—

20 (A) may substitute an alternative frequency
21 or band of frequencies for the frequency or band
22 that is subject to such determination and with-
23 draw (or limit) the assignment of that alternative
24 frequency or band in the manner required by sub-
25 section (a); and

1 (B) shall submit a statement of the reasons
2 for taking the action described in subparagraph
3 (A) to the Committee on Energy and Commerce
4 of the House of Representatives, the Committee
5 on Commerce, Science, and Transportation of the
6 Senate, and other appropriate committees of the
7 Congress.

8 (2) GROUNDS FOR SUBSTITUTION.—For purposes
9 of paragraph (1), the following circumstances are de-
10 scribed in this paragraph:

11 (A) the reassignment would seriously jeopardize
12 the national defense interests of the United
13 States;

14 (B) the frequency proposed for reassignment
15 is uniquely suited to meeting important govern-
16 mental needs; or

17 (C) the reassignment would seriously jeop-
18 ardize public health or safety.

19 (3) CRITERIA FOR SUBSTITUTED FREQUEN-
20 CIES.—For purposes of paragraph (1), a frequency may
21 not be substituted for a frequency identified by the
22 report of the Secretary under section 4(a) unless the
23 substituted frequency also meets each of the criteria
24 specified by section 4.

1 (c) LIMITATION ON DELEGATION.—Notwithstanding
2 any other provision of law, the authorities and duties estab-
3 lished by this section may not be delegated.

4 SEC. 6. DISTRIBUTION OF FREQUENCIES BY THE COM-
5 MISSION.

6 Not later than 1 year after the President notifies the
7 Commission pursuant to section 5(a)(4), the Commission shall
8 prepare and submit to the President and the Congress a plan
9 for the distribution under the Act of the frequencies reallo-
10 cated pursuant to the requirements of this Act. Such plan
11 shall—

12 (1) not propose the immediate distribtion of all
13 such frequencies, but shall—

14 (A) reserve a significant portion of such fre-
15 quencies for distribution more than 10 years after
16 the date of enactment of this Act; and—

17 (B) gradually distribute the remainder over
18 the course of not less than 10 years; and

19 (2) contain appropriate provisions to ensure—

20 (A) the availability of frequencies for new
21 technologies and services in accordance with the
22 policies of section 7 of the Act; and

23 (B) the availability of frequencies to stimulate
24 the development of such technologies.

1 SEC. 7 AUTHORITY TO RECOVER REASSIGNED FREQUENCIES.

2 (a) AUTHORITY OF PRESIDENT.—Subsequent to the
3 withdrawal of assignment to Government stations pursuant
4 to section 5, the President may reclaim reassigned frequen-
5 cies for reassignment to Government stations in accordance
6 with this section.

7 (b) PROCEDURE FOR RECLAIMING FREQUENCIES.—

8 (1) UNALLOCATED FREQUENCIES.—If the fre-
9 quencies to be reclaimed have not been allocated or as-
10 signed by the Commission pursuant to the Act, the
11 President shall follow the procedures for substitution of
12 frequencies established by section 5(b) of this Act.

13 (2) ALLOCATED FREQUENCIES.—If the frequen-
14 cies to be reclaimed have been allocated or assigned by
15 the Commission, the President shall follow the proce-
16 dures for substitution of frequencies established by sec-
17 tion 5(b) of this Act, except that the notification re-
18 quired by section 5(b)(1)(A) shall include—

19 (A) a timetable to accommodate an orderly
20 transition for licensees to obtain new frequencies
21 and equipment necessary for its utilization; and

22 (B) an estimate of the cost of displacing com-
23 mercial licensees.

24 (c) COSTS OF RECLAIMING FREQUENCIES; APROPRIA-
25 TIONS AUTHORIZED.—The Government of the United
26 States shall bear all costs of reclaiming frequencies pursuant

1 to this section, including the cost of equipment which is ren-
2 dered unuseable, the cost of relocating operations to a differ-
3 ent frequency, and any other costs that are directly attributa-
4 ble to the reclaiming of the frequency pursuant to this sec-
5 tion. There are authorized to be appropriated such sums as
6 may be necessary to carry out the purposes of this section.

7 (d) EFFECTIVE DATE OF RECLAIMED FREQUEN-
8 CIES.—The Commission shall not withdraw licenses for any
9 reclaimed frequencies until the end of the fiscal year follow-
10 ing the fiscal year in which the President's notification is
11 received.

12 (e) EFFECT ON OTHER LAW.—Nothing in this section
13 shall be construed to limit or otherwise affect the authority of
14 the President under section 706 of the Act.

15 SEC. 8. DEFINITIONS.

16 As used in this Act:

17 (1) The term "Secretary" means the Secretary of
18 Commerce.

19 (2) The term "Commission" means the Federal
20 Communications Commission.

21 (3) The term "the Act" means the Communica-
22 tions Act of 1934.

23 (4) The term "Commercial carrier" means any
24 entity that uses a facility licensed by the Federal Com-
25 munications Commission pursuant to the Communica-

- 1 tions Act of 1934 for hire or for its own use, but does
- 2 not include Government stations licensed pursuant to
- 3 section 305.

Senator INOUE. And now may I call on the first panel, the Assistant Secretary for Communications and Information, the Hon. Janice Obuchowski; and the Chief Engineer, Office of Engineering Technology, FCC, Dr. Thomas P. Stanley.

Madam Secretary.

**STATEMENT BY JANICE OBUCHOWSKI, ASSISTANT SECRETARY
FOR COMMUNICATIONS AND INFORMATION, DEPARTMENT OF
COMMERCE**

Ms. OBUCHOWSKI. Mr. Chairman and members of the subcommittee, thank you for this opportunity to testify on the subjects covered by the Emerging Telecommunications Technologies Act of 1990. With me today is Richard Parlow, the Associate Administrator of NTIA's Office of Spectrum Management.

Spectrum shortage is becoming a front-burner issue, assuming its rightful place on the Nation's competitiveness agenda. It is appropriate that the Senate begin to address the pressing problems caused by the ever-increasing demand for the radio spectrum. And I commend you, Mr. Chairman, for holding this hearing.

The National Telecommunications and Information Administration manages the Federal Government's use of the radio spectrum. Within the United States, in the spectrum below 5,000 megahertz, the Federal Government has exclusive use of 12.9 percent, the private sector has 28.4 percent, and the remainder, 58.7 percent, is shared between both.

The Federal Government agencies use the radio spectrum in the establishment of radio communication systems uniquely supporting their government missions. The government already places heavy reliance on the private sector in providing telecommunications services for its own use. For example, the FTS system.

Examples of unique government radio services include the National Oceanographic and Atmospheric Administration weather broadcast stations operating nationwide, and the FAA's use of radio in air traffic control and aircraft navigation and safety. At the present time, these federal systems are pervasive, and there are now no vacant government frequency bands.

Since I assumed my responsibilities at NTIA almost exactly one year ago, we have made substantial progress toward updating and improving our Nation's spectrum management policies and processes. Last year, NTIA initiated a comprehensive policy review of the use and management of radio spectrum in the United States. We have received 117 comments, and we hope to complete the report by the end of the year.

Regarding spectrum planning, I have communicated with Chairman Sikes, proposing a cooperative NTIA/FCC process to identify and review specific strategic spectrum planning initiatives. One matter of particularly high importance is the accommodation of future land-mobile services. And NTIA, in coordination with the FCC and the Department of State, is preparing for the ITU's 1992 World Administrative Radio Conference for Mobile Services, and we expect to release a definitive package for this work in October 1990.

Turning to the Emerging Telecommunications Technologies Act. As you know, I had the opportunity in November of last year to testify before the House Subcommittee on Telecommunications and Finance regarding H.R. 2965. The administration opposes that bill in its current form. We do, however, support its commitment to private sector innovation and to many of its concepts.

As a Nation with a tradition of leadership in radio-based telecommunications, we must be sensitive to the innovative talents of our people. We must, as you have noted, Mr. Chairman, foster a climate where these talents can bear abundant fruit. If these talents are stifled, we face the prospect of losing our competitive edge just as the world is awakening to the realization of what advanced telecommunications can mean to standards of living everywhere.

At the same time, government radio communications systems in place today have a replacement value in excess of \$100 billion. And the Federal Government's use of spectrum-dependent telecommunications in service of the American public will not diminish, but will increase over time. The concept of transferring an arbitrary amount of spectrum to the private sector without detailed knowledge of requirements or potential degradation of government services is, at this point, imperfect.

One major problem is that the Department of Commerce is given the responsibility to recommend frequencies to be transferred without the database and analytical tools necessary to do the job. If government spectrum being used is transferred, then government systems must find a new home somewhere in the spectrum. There is no free lunch. There is a cost, again, as you have noted, associated with relocation.

Should the government be asked to released "free spectrum" to entrepreneurs who will make millions of dollars of profit, while the federal agencies must rebuild their systems, who pays for this free spectrum?

Ultimately, the taxpayer.

As you have recognized, Mr. Chairman, relocation has its costs. We could support, however, a bill that contains procedures that would still make additional spectrum available to the private sector, while not creating excessive costs to the government. I would like to mention the modifications necessary to achieve this.

The figure of 200 megahertz to be transferred to the private sector is not based on any domestic or economic requirement of which we know. This figure may in fact be too large or too small. Since it is an indefinite number, it should not be specified in legislation. More use by the private sector of under-used federal spectrum should be the goal, and such a goal is certainly acceptable to us.

The transfer of exclusive government spectrum to the private sector is not the only method to make spectrum available. The government and the private sector have shared many frequency bands successfully in the past, and are doing so now. Increased sharing of frequency bands instead of reallocation to the private sector may in many cases achieve the same result, but without the necessity of accommodating government systems and incurring excessive costs.

While speaking of costs, there is no mechanism in the current bill that authorizes the reimbursement of federal agencies for the cost of relocating displaced systems. With operating budgets of federal agencies under downward pressure, there is no margin to fund replacement systems without additional funding sources. We cannot support a bill that does not provide for reimbursed costs for displaced federal telecommunications systems.

Another problem with the bill is that it does not provide a mechanism to recover the cost to the taxpayer of reallocating spectrum to private use. At least part of funds needed to relocate federal radio systems should come from spectrum auctions. H.R. 2965 was amended to remove the prohibition of spectrum auctions, but what is needed is explicit authorization to entitle the Federal Communications Commission to use the competitive bidding process to assign licenses to use this new spectrum.

H.R. 2965 requires that affected government frequency assignments be withdrawn within six months of receipt of the Secretary's report on reallocation. Since there cannot be a lapse in the government telecommunications services provided, replacement systems could not be planned, procured, and installed within six months, as would be necessary if the current bill were enacted.

Finally, we have in place an advisory council, the Frequency Management Advisory Council, with expertise in frequency allocations and spectrum management matters. The committee called for in the bill should be formed by augmenting the FMAC, and providing for representation by federal agencies.

Mr. Chairman, I very much applaud your ground-breaking work on the spectrum competitiveness question. At NTIA we appreciate this opportunity to share views with you. And I am prepared to respond to any questions that you may have.

[The statement follows:]

Statement of

Janice Obuchowski
Assistant Secretary for
Communications and Information
U.S. Department of Commerce

Mr. Chairman and Members of the Subcommittee:

Thank you for this opportunity to testify on the subjects covered by the Emerging Telecommunications Technologies Act of 1990. Spectrum shortage is becoming a "front-burner" issue, assuming its rightful place on the nation's competitiveness agenda. It is appropriate that the Senate begin to address the pressing problems caused by the ever-increasing demand for radio spectrum, and I commend you, Mr. Chairman, for holding this hearing.

In addition to serving as the President's principal advisor on telecommunications, the National Telecommunications and Information Administration (NTIA) manages the Federal Government's use of the radio spectrum. Within the United States, this spectrum is allocated up to 300,000 MHz. Of that, only 1.4% is allocated exclusively for the Federal Government, and over 95% is shared with private sector users. In the spectrum below 5,000 MHz, the Federal Government has exclusive use of 12.9%, the private sector has 28.4%, and the remainder (58.7%) is shared between both.

The Federal Government agencies use the radio spectrum in the establishment of radiocommunication systems supporting their missions. The Government is not a telecommunications provider to the public, nor does it receive any revenue from operations of

any of its radiocommunication systems. The Government places heavy reliance on the private sector in providing telecommunications services for its own use. The Government establishes separate radio services only when they are required to meet unique governmental needs, or are required in the national interest.

Examples of unique government radio services include the National Oceanographic and Atmospheric Administration (NOAA) weather broadcast stations operating nation-wide, and the Federal Aviation Administration's use of radio in air traffic control and aircraft navigation and safety.

Nonetheless, as unique radio requirements have increased, the Government has established radiocommunication systems in the exclusive Government frequency bands to support its various missions. At the present time, these systems are so pervasive that there are now no vacant Government frequency bands. Spectrum availability is becoming a serious problem in the more populated bands.

Even the military services, that use just under half of all Government frequency assignments, will have additional telecommunications requirements in the future. With a leaner defense budget, the military may depend even more on radio and electronic systems to provide a "force multiplier" effect.

Historically, advances in technology have opened the higher frequency bands for use, and allowed more efficient use of lower bands by reducing the required bandwidth for a given signal. There is reason to believe that technology can be advanced further, permitting even more efficient use and sharing of the spectrum commonly used today, and allowing use of those portions of the spectrum that are not heavily used at present. New government radiocommunications requirements may be satisfied, at least in part, by the spectrum made available in technological advances.

We believe that efficient spectrum use is a public good. Therefore, to help alleviate the spectrum shortage, the Federal Government is constantly striving to increase the spectral efficiency of its systems, while at the same time maintaining a high level of support for critical missions.

Since I assumed my responsibilities at NTIA almost exactly one year ago, we have made substantial progress toward updating and improving our nation's spectrum management policies and processes. Last year, NTIA initiated a comprehensive policy review of the use and management of radio spectrum in the United States. Via a Notice of Inquiry, NTIA asked the private sector and the Federal agencies their views on a broad range of spectrum management issues. The study is examining ways to provide

incentives for spectrum efficiency, to increase Federal/private sector sharing, and to encourage flexibility to allow more innovative spectrum uses. We will be conducting examinations in areas of national spectrum planning, the flexibility and efficiency of the "block" allocation process, alternatives to the current allocation system, and long range planning. We are reviewing the comments received, and we hope to complete the report at the end of the year, or early next year.

Regarding spectrum planning, I have communicated with Chairman Sikes, proposing an NTIA/FCC process to identify and review specific strategic spectrum planning initiatives. One matter of particularly high importance is the accommodation of future land mobile services. A process such as this will aid in serving the needs of the public and government in the context of the overall national interest.

NTIA, in coordination with the FCC and the Department of State is preparing for the International Telecommunication Union (ITU) 1992 World Administrative Radio Conference for the Mobile Services (WARC-92). The ITU's Administrative Conference has established the agenda for the WARC-92, incorporating several U.S. government and industry requirements that were identified through NTIA's Interdepartment Radio Advisory Committee and the FCC's Notice of Inquiry. NTIA and the FCC are concluding

coordination on a definitive package for the WARC. This package is expected to be released for public comment in October 1990.

I've had meetings with representatives from the Department of Defense in which they have underscored their continued need for spectrum. They are concerned that their multi-billion dollar investment in radio communications equipment could be in jeopardy if military spectrum is reallocated.

NTIA is fortunate in receiving the assistance of the Frequency Management Advisory Council (FMAC). The FMAC is composed of private sector individuals with wide ranges of experience in spectrum matters. The FMAC is currently addressing spectrum planning matters and issues that will be raised at WARC-92

The Emerging Telecommunications Technologies Act

I had the opportunity in November of last year to testify before the House Subcommittee on Telecommunications and Finance regarding H.R. 2965 (the Dingell Bill), which is similar to S.2904. The Administration opposes H.R.2965 and S.2904 in their current forms. We do, however, support many of the concepts contained in these bills. The need for spectrum in the private sector is evidenced in the number of petitions for such spectrum received by the Commission, and the number of private sector entities that visit NTIA in search of potential spectrum space.

To those who visit us, we offer advice and guidance on accommodating their spectrum uses.

As a nation with a tradition of leadership in radio-based telecommunications, we must be sensitive to the innovative talents of our people. If these talents are stifled, we face the prospect of losing the competitive edge in providing telecommunications products and services to a world awakening to the realization of what the application of advanced telecommunications can mean to their standard of living.

The Federal Government's use of spectrum-dependent telecommunications is primarily to support Government services to the public. The demand for these services, and the corresponding telecommunications supporting these services, will not diminish, but will increase over time. The concept of transferring an arbitrary amount of spectrum to the private sector without a detailed knowledge of requirements, or the potential degradation of Government services resulting from a loss of spectrum, would be difficult to justify. The major problem is that the Department of Commerce is given the responsibility to recommend frequencies to be transferred without the data base and analytical tools necessary to do the job. NTIA would prefer to rely on economic incentives rather than on legislative edicts.

Government radiocommunications systems in place today have a replacement value in excess of one hundred billion dollars. These systems have been established to support the missions of the various Federal agencies, including the military services. We cannot reduce the operations of these systems without reducing essential Government services. If Government spectrum being used is transferred, then the Government systems must find a new home somewhere in the spectrum. There is no free lunch. If these systems must relocate, there is an associated cost to accomplish this. This cost would probably be in excess of the original acquisition and installation cost. Should the government be asked to release "free" spectrum to entrepreneurs who will make millions of dollars in profit, while the Federal agencies must rebuild their systems? Who pays for this "free" spectrum? Ultimately, the taxpayer pays.

Having noted that the current bill is flawed in several respects, we could support, however, a bill that has the same intentions, but contains procedures that would still make additional spectrum available to the private sector, while not creating excessive costs to the Government. I would like to mention the modifications to S.2904 necessary to achieve these ends.

The figure of 200 MHz to be transferred to the private sector was not based on any domestic or economic requirement of which we know. This figure may be too large, or too small. Since it is

an arbitrary number, it should not be specified in legislation. More use by the private sector of underused Federal spectrum should be a goal, and not a requirement. Such a goal would be acceptable.

The transferring of exclusive Government spectrum to the private sector is not the only method to make spectrum available. The Government and the private sector have shared many frequency bands successfully in the past, and are doing so now. Increased sharing of frequency bands, instead of reallocation to the private sector, may in many cases achieve the same result, but without the necessity of reaccommodating Government systems and incurring excessive costs.

There will be, of course, instances that would require Government systems to relocate. Depending on the type of system, and the extent of the deployment, the cost associated with the relocation may vary considerably. Other considerations being equal, or nearly so, the cost of reaccommodation should be one of the criteria in the selection of frequencies made available to the private sector through reallocation.

While speaking of costs, there is no mechanism in the current bill that authorizes the reimbursing of Federal agencies for the cost of relocating displaced telecommunications systems. With operating budgets of Federal agencies under pressure to be

reduced, there is no margin to fund replacement systems without additional funding sources. We cannot support a bill that does not provide for reimbursed costs for displaced Federal telecommunications systems.

Another major problem with the bill is that it does not provide a mechanism to recover the costs to the taxpayer of reallocating spectrum to private use. At least part of funds needed to relocate Federal radio systems should come from spectrum auctions. S.2904 prohibits the use of such auctions. While the House bill, H.R. 2965, was amended to remove the prohibition of spectrum auctions, what is needed is explicit authorization to enable the Commission to use the competitive bidding process to assign licenses to use this new spectrum. This would not only generate revenue, but help ensure that the new spectrum is assigned to its highest valued commercial uses. We only need to note the rapid profits made by the turnover of commercial radio licenses to conclude that spectrum is a valuable asset and should not be given away.

S.2904 requires that affected Government frequency assignments be withdrawn within six months of receipt of the Secretary's report on reallocation. This time period is too short. Government telecommunications systems being installed today were budgeted and planned for years ago. Since there cannot be a lapse in the Government telecommunication services provided, replacement

systems could not be planned, procured and installed within six months, as would be necessary if the current bill were enacted. A more reasonable time would be three years, considering the operation of the Federal budget cycle.

The private sector advisory committee as called for in the House bill would be responsible for advising the Secretary on the selection of frequencies to be made available to the private sector. This committee would also prepare a report recommending changes to the process of allocating the spectrum between the Government and the private sector. In 1965, The Secretary established an advisory council (the FMAC) that has expertise in frequency allocations and spectrum management matters. By using this organization as a nucleus, the committee called for in the bill could be formed by augmenting the FMAC. To provide a balanced analysis of spectrum selections and spectrum allocation issues, it would be appropriate that representatives from Federal agencies be members of this committee.

Mr. Chairman and members of the Subcommittee, I appreciate this opportunity to share my views with you, and I am prepared to respond to any questions you may have.

Senator INOUE. Thank you very much, Madam Secretary. Dr. Stanley?

**STATEMENT BY DR. THOMAS P. STANLEY, CHIEF ENGINEER,
OFFICE OF ENGINEERING AND TECHNOLOGY, FEDERAL COM-
MUNICATIONS COMMISSION**

Dr. STANLEY. Mr. Chairman, members of the subcommittee, thank you for the opportunity to come before you and discuss the emerging Telecommunications Technologies Act of 1990. Chairman Sikes testified in support of this initiative earlier.

Let me say that I also support this legislation. With the growing sophistication of technology and the increasing demands on radio spectrum, it is essential that we explore every avenue that might lead to growth of the spectrum inventory.

Goods and services dependent on the use of spectrum are becoming an increasing part of the economy of our country. Rapid transmission of voice and data communications requires a modern infrastructure of dedicated frequencies. And, spectrum availability is directly related to the performance and global competitiveness of our domestic electronics manufacturing industries.

Clearly, the addition of at least 200 megahertz of spectrum from the Federal Government, if that proves feasible, suggests many important possibilities. The growth of new and innovative services would be stimulated. Existing services might be able to expand, providing increased competition with all the benefits to the public.

The Federal Government would be encouraged to rely on private sector systems to a larger degree. Privatization tends to increase the tax base as well as stimulate business growth. More important, auctions, if permitted, could be an efficient and cost-effective way of assigning frequencies for nonbroadcast purposes.

A particular important feature of the bill is that it proposes to set in motion a permanent national spectrum planning process by formalizing the meetings between the Chairman of the FCC and the Assistant Commerce Secretary for Communications and Information, and by requiring widely disseminated annual reports. The process of spectrum planning would be given the public attention and scrutiny it deserves.

The most significant feature of S. 2904 is that it creates a pool of spectrum to be used for future services and technologies. I cannot emphasize enough the value of having spectrum when you need it. The Commission has not enjoyed such a luxury for years. It seems that more and more often I am in the position of having to discourage some would-be entrepreneur by telling him, "It sounds like an interesting idea, but I do not know where you are going to get the spectrum for it."

During my time as Chief Engineer, we have not been able to introduce a single new service, or for that matter enhance an old one, without an accompanying, often tortuous search for spectrum to house it. It is finding the spectrum that has taken the time in most rulemaking proceedings. Often, there have been unsatisfactory compromises in the amount of spectrum we could afford to allocate to a given service. In other cases, existing licensees have been required to relocate to other frequencies.

I support S. 2904's requirement that a significant amount of spectrum be set aside for a minimum of 10 years as a reserve for yet unknown technologies and services. If this had been done previously, then perhaps we at the Commission would not be wrestling now with the question of where to find spectrum for the new emerging personal communications networks, or the recent proposals having to do with digital audio broadcasting.

I welcome the concept of a new technology reserve, and believe that having such a reserve strikes a good balance between satisfying present needs and accommodating future technologies and services.

Having spectrum available when a new idea comes along is bound to streamline the administrative process. It would encourage American manufacturers to bring forth innovative technology and speed this technology to the public.

It should be noted that the cellular radio industry today operates in an allocation of spectrum obtained in part from the Federal Government. This industry is worth billions today, and is changing the way we work and how we communicate.

The lesson is a simple one. Given the incentives of sufficient spectrum and a receptive regulatory environment, we can continue to make our mark in the world economy.

Finally, I note that S. 2904 echoes the latest version of H.R. 2965, which removed the auction prohibitions, and we are very pleased to see that removal. This prohibition was of great concern to Chairman Sikes last November. Indeed, at the time he urged the House members to review their policy and allow the use of auctions to make certain assignments.

I share his concern and encourage such a review. Use of auctions in many cases would be an efficient and cost-effective way of expediting frequency assignments. Moreover, auctions would allow the public to recapture at least a portion of the wealth created by the use of their own resource, the electromagnetic spectrum.

Mr. Chairman, you are to be commended for bringing this important bill forward and for illuminating what I would call a frequently little-understood and little-appreciated function of Federal Government.

I thank you for your time and attention, and would be happy to answer any questions.

[The statement follows:]

Statement of

Thomas P. Stanley
Chief Engineer, Federal Communications Commission

Mr. Chairman and Members of the Subcommittee:

Thank you for the opportunity to come before you and discuss the "Emerging Telecommunications Technologies Act of 1990." Chairman Sikes testified in support of this initiative earlier and let me say that I also support this legislation. With the ever growing sophistication of technology and its increasing demands for access to the radio spectrum, it is essential that we explore every avenue that might lead to the growth of the spectrum inventory.

Goods and services dependent upon use of the spectrum are becoming an increasing part of the economy of the country. Rapid transmission of voice and data communications, so vital to the functioning of our businesses requires a modern infrastructure of dedicated frequencies. Also, spectrum availability is directly related to the performance and global competitiveness of our rapidly growing electronics manufacturing industries.

Clearly, the addition of at least 200 MHz of spectrum from the Federal Government, if that proves feasible, suggests many important possibilities. The growth of new and innovative services would be stimulated. Existing services might be able to expand, providing increased competition with all the resulting benefits to the public. Increased competition usually means less regulation, and this too is a benefit. The Federal Government would be encouraged to rely more on private sector communications systems.

Privatization tends to increase the tax base as well as stimulate business growth. More important, auctions could be an efficient and cost effective method of assigning frequencies for non-broadcast purposes.

A particularly important feature of the bill is that it proposes to set in motion a permanent national spectrum planning process. Over the years, NTIA and the FCC have enjoyed a most cooperative relationship. Our staffs are in constant contact and Chairmen of the Commission have met regularly with their NTIA counterparts. The close cooperation between the two agencies is not widely understood. Few understand or appreciate that there is, in fact, a spectrum sharing and planning process that has been at work for many years. By formalizing the meetings between the Chairman of the FCC and the Assistant Secretary of Communications and Information and requiring widely disseminated annual reports containing spectrum planning activities, the process of spectrum planning would be given the recognition it deserves.

The most significant feature of S. 2904 is that it creates a pool of spectrum to be used for future services and technologies. I cannot emphasize enough the value of having spectrum when you need it. The Commission has not enjoyed such a luxury for many years. It seems that more and more often I am in the position of discouraging some would-be entrepreneur by telling him, "Sounds like an interesting idea, but I don't know where we're going to get the spectrum." During my time as Chief

Engineer, we have not been able to introduce a single new service (or enhance an old one for that matter) without an accompanying, often tortuous, search for spectrum to house it. It is finding the spectrum that has taken the time in most rulemaking proceedings. Often there have been unsatisfactory compromises in the amount of spectrum we could afford to allocate to a given service. In other cases, existing licensees have been required to relocate to other frequency bands.

A state of limited spectrum availability requires difficult choices, arrived at with difficulty. Industries are pitted against one another in a display producing heat but little light. To be sure, the severely limited availability of spectrum has produced some benefits. We have learned to allocate spectrum more efficiently. Of necessity, we have come to promote spectrum saving technologies and spectrum sharing, to make the most of the spectrum available. I think technology can provide us with further spectrum saving techniques. We certainly have not learned all there is to know about squeezing more and more information into smaller and smaller amounts of spectrum. But there is a price to pay at each stage and I believe that for many of the traditional uses of spectrum, we are approaching a point of diminishing returns.

Other countries are already taking steps to ensure that their industries have access to spectrum for the continued introduction of new products. In both Europe and Japan, blocks of spectrum have been set aside

for innovative uses. Our task is somewhat more difficult. The United States has made much more intensive use of spectrum for many years, and, in the process, has benefited economically. In order to continue to reap the benefits of spectrum use, and compete in the rapidly emerging world market in the future, it is necessary to establish our plans now.

I support S. 2904's requirement that a significant amount of spectrum be set aside for a minimum of ten years as a reserve for new technologies and services. One can, of course, quibble with the time period. Forecasting technology is difficult in the short term and largely guesswork in the long term. We can always be concerned that in six or seven years some new service might have to be foregone because of a restriction on the use of our reserves. But having said this, I wish spectrum had been placed in such a reserve ten years ago. If it had been, then perhaps we would not be wrestling now with the question of how to find spectrum to accommodate the emerging Personal Communications Networks or recent proposals to introduce Digital Audio Broadcasting. I welcome the concept of a new technology reserve and believe that having such a reserve strikes a good balance between satisfying present needs and accommodating future technologies and services.

Having spectrum available when a new idea comes along is bound to streamline the administrative process, encourage American manufacturers to bring forth innovative technology, and speed this technology to the public.

It should be noted that the cellular radio industry began with an allocation of spectrum obtained, in part, from the Federal Government. This industry is worth billions today, and is changing the way we work and communicate. The lesson is a simple one. Given the incentives of sufficient spectrum and a receptive regulatory environment, we can continue to make our mark in the world economy.

There should be no illusions about the effect of this bill. For all the great benefits it will undoubtedly provide, it can not solve all our spectrum problems. Nevertheless, it, or legislation like it, is an inevitable step in our ever more sophisticated use and regulation of the radio spectrum. It will be the Commission's responsibility to allocate the spectrum as the precious resource it is. Thus, our efforts to reduce channel widths, and requirements for spectrum saving techniques, such as trunking, will have to continue. We must continue to emphasize, and, perhaps, even require, spectrum efficient technologies.

Finally, if the time has come to review the government's use of the spectrum, then we too have a responsibility to look to our own house. I can promise you that we are doing so. In an attempt to make the most efficient and sensible use of the spectrum, whether or not we have the opportunity to factor in another 200 MHz, we are reviewing spectrum use, exploring the possibility of reallocating our spectrum, even at the cost of relocating some of our licensees, and studying techniques for determining the degree to

which allocated spectrum is being used. At the present time the staff is engaged in preparing for the 1992 World Administrative Radio Conference. Among the spectrum issues at that conference will be the question of new international allocations in the 500 to 3000 MHz band. That band encompasses a significant portion of the spectrum we are discussing today. In conjunction with the Federal Government, we have already begun a review of all uses in this broad area of spectrum in preparation for the WARC. Thus, it may be that some of the groundwork for the most efficient use of this spectrum will already have been established.

I note that S. 2904 echoes the latest version of H.R. 2965, the House bill which removed auction prohibitions. This prohibition was of great concern to Chairman Sikes last November. Indeed, at that time, he urged the House members to review their policy and allow the use of auctions to make certain assignments. I share his concerns and encourage such a review. Use of auctions in many cases would be an efficient and cost effective method of expediting frequency assignments. Moreover, auctions would allow the public to capture at least a portion of the wealth created by the use of its spectrum.

I thank you for your time and attention and will try to answer any questions you may have.

Senator INOUE. Thank you very much, Dr. Stanley.

May I just ask a question for both of you? Do you believe the United States is falling behind other nations in the development of new technologies?

Ms. OBUCHOWSKI. Let me begin.

As far as I can see, I do not believe we are falling behind the rest of the world. Indeed, one of the reasons we have this problem with scarcity—and if you will hear both of our points of view, here, there is a full spectrum on both sides of the aisle—is that we have indeed been very, very active in using the spectrum over the last 50 or so years.

From a technology standpoint we are clearly in a world leadership position now. The question becomes, is this real tightness that exists within the spectrum resource going to make it harder for innovators' to step up to the plate and be recognized as quickly as they can. Right now, we are in good shape. I think we need to streamline our processes so that condition continues into the future.

Dr. STANLEY. Our R&D posture—viewed by many—is behind many other countries. Somehow the availability of spectrum in those countries, where blocks of spectrum have been set aside, seems to have encouraged new ideas, new communications systems. Now, falling behind is a very strong term, but if falling behind means the ideas are coming from elsewhere, it looks like we are falling behind.

Senator INOUE. I note from the record of the hearings in the House that five former Administrators of the NTIA supported this concept. Do you think they were wrong?

Ms. OBUCHOWSKI. I surely do not think they are wrong in their reasoning, and I, too, went back and reviewed the record of their testimony, and they all cited that in general a proposed reallocation would have three very healthy results. First off, it would give the NTIA more clout in being sure that all of its Federal agencies move more quickly and more progressively. Secondly, it would serve as a prod for us to reexamine areas where there might be shortage, and thirdly, it would encourage us to open the process.

I would want to say that since I became an Administrator, and actually prior to that hearing, we began this comprehensive spectrum review study, where we will be making proposals specifically to further open our processes. In terms of a prod, I think that the interest that this committee, as well as the House, has had in spectrum is having a very salutary effect on both the FCC and NTIA in advancing, streamlining, giving a second look to its processes: and finally, to the extent that this bill, or a similar proposal, gives NTIA more clout, I am all for it.

Senator INOUE. Madam Secretary, you note in your testimony that there are no vacant Government bands at this time.

Ms. OBUCHOWSKI. Yes, sir.

Senator INOUE. Yet I am confused, because later on you say there should be greater sharing. What are you sharing, if there are no bands available?

Ms. OBUCHOWSKI. Well, basically, as engineering becomes more precise, and as services become more diverse, it is possible for two users to use the precise same spectrum.

For example, currently a variety of personal communications services such as in Part 15—and those are garage door openers, that type of electronic device, alarm services, et cetera—share frequency with Government fixed communications. That is an existing sharing mechanism.

We are looking forward to further forms of sharing as we go forward.

Senator INOUE. According to your testimony, our Federal Government has access to about 71 percent of the spectrum below 5 gigahertz, either exclusively or shared, and if this bill is passed and the Government is required to relinquish 200 megahertz, this would amount to about 1/17th of the total amount of spectrum used by the Federal Government. Do you believe taking away 1/17th would cause undue hardship to the Federal Government?

Ms. OBUCHOWSKI. Sir, if you factored in, as you have, the shared spectrum, I would generally not. The difficulty with the bill as it is now drafted is that the 200 megahertz would come out of the 11 percent, which is exclusively dedicated to the Federal Government use, with only the possibility of 20 percent of that coming out of shared areas, and that I think is what would work the unreasonable hardship.

Senator INOUE. Dr. Stanley, the administration has stated that they would prefer that we would delete the reference to 200 megahertz and just leave it as a general goal that we should increase the available spectrum. What do you think of this?

Dr. STANLEY. I think it is important to have an objective in this type of analysis, either as lower bound or as something to shoot for. I think the process of negotiation for spectrum and of deciding which is spectrum to look at, and how much, is more of a rational one when there is a target figure.

Ms. OBUCHOWSKI. Mr. Chairman, on that point of target figure we can be in agreement, and in fact, as the administration position now stands, 200 megahertz as a target is perfectly acceptable to the administration as well. It is the mandatory nature of this before we have the tools in place that is causing the difficulties.

Senator INOUE. History shows that technology is moving into higher and higher frequencies. If there is a shortage of frequencies, do you believe engineers can develop ways to use the higher frequencies for these new services?

Dr. STANLEY. Yes, indeed. I think we are seeing that all the time. Approximately 10 years ago, there was a fairly strong feeling of not being able to use many of the bands we are using now for mobile communications. Virtually on the order of every 10 years or so, it seems as though there are a sufficient breakthroughs that make more and more advancement possible.

It is very much like the technical frontier. It is a frontier where things are difficult, and with the passage of time it looks as though more and more capability is established at the higher frequencies. You are running up against a natural limit. At some point, nature catches up with you, but the answer is yes, I believe we can do more and more as time goes by.

Ms. OBUCHOWSKI. Mr. Chairman, in that regard I would want to note that in terms of mining those upper bands of the spectrum, a great deal of that research and development has actually been

done in the Government area. For example, some of the most ground-breaking work has been done by NASA and DOD in the context of various space and military systems.

One of our concerns—and we do a great deal of this mining at NTIA's Institute for Telecommunication Sciences—is that we in this country are making the Governmental and the pure research breakthroughs, and yet our industry is not necessarily as quick to pick up. We have many foreigners picking up on the commercialization of some of these technical breakthroughs.

Senator INOUE. Madam Secretary, if this measure was amended to include a procedure or process by which the Federal Government can be compensated or reimbursed when moving to another frequency, would that satisfy you?

Ms. OBUCHOWSKI. That would go a long way toward satisfying us, sir.

Senator INOUE. Thank you very much.

Senator Burns?

Senator BURNS. Thank you, Mr. Chairman.

Dr. Stanley, we talk about expansion of 200 megahertz. Could you describe to this committee how big that would be compared to what we are using now, say for standard AM or FM broadcast? Mostly FM broadcast, in that case.

Dr. STANLEY. OK. Let me see. Currently, the AM bands are relatively small, something on the order of, say, 1200 kilohertz, which is approximately about 1/5th of one TV channel, and so the AM band is quite small. 200 MHZ is 10 times the amount we currently use for the FM band. It is approximately 30-some times the amount used for a television channel.

Senator BURNS. OK. They tell us that we are around 205 megahertz band now for FM radio as we know it today, on our little car radios.

Dr. STANLEY. Approximately so.

Senator BURNS. So we are talking about doubling the size, basically, of the FM band as we know it, is that correct?

Dr. STANLEY. Not exactly. It is really multiplying it by 10. The FM band is 88 to 108 megahertz. That is 20 megahertz, and 200 is 10 times that amount.

Senator BURNS. Okay. I just think there are a lot of people that do not understand—me being one of them. You both have spoken about the allocation of this additional spectrum to the private sector. You have indicated some support for auctions and how spectrum would be meted out on a competitive basis. Why do you support such a way to mete out that additional spectrum?

Ms. OBUCHOWSKI. Well, I will just begin.

If you look at the cellular area, we have done some relatively rough calculations and we would like to make them more precise, but at this point the approximate market value of the cellular spectrum, which some people think is, at this point, perhaps the most—or one of the most valuable commercial set of bands, is somewhere between \$66 billion and \$88 billion.

When you look at the kind of public good that is behind this, there is a question in our minds why this is being basically given away for nothing.

Senator BURNS. The administration has estimated \$3.4 billion could be raised over a 2-year period if auctions are implemented. Do you have any estimate on how much additional revenue could be raised if we were to implement auctions for this new spectrum that will be made available to the private sector?

Ms. OBUCHOWSKI. Well, Senator Burns—and I will defer also to Dr. Stanley—from our vantage point the value differs dramatically in the orders of magnitude, depending on where within these bands the spectrum might be.

When you are looking at the prime bands—the ones that are close to the existing cellular bands, for example, for mobile services, the administration has given a figure for 4 megahertz of approximately \$3.3 billion. That, I think, is choice spectrum real estate. Typically, the number would be far lower than that.

Dr. STANLEY. Just a brief comment on that. I think the Secretary has pointed out a very key aspect: where the spectrum is relative to other bands, is quite important. It is very hard to come up with a single number. It is very much like real estate. An acre on downtown Manhattan was worth so much. Something out in the plains is worth so much else, different to different people. In some areas, very valuable spectrum, I have heard, if estimated on the order of, say, \$.5 billion a megahertz.

Senator BURNS. What is it, the old story that there are only three things to consider when buying real estate—location, location and location?

Now, as you know, the bill requires that 200 megahertz of spectrum be transferred to the private sector from the Federal Government. In your estimation Dr. Stanley, do you think that figure is too large, too small? Are you comfortable with that?

Dr. STANLEY. In the sense of considering where we sit, that looks very, very large. But then, let me tell you some of the kinds of things on our plate now.

Just within the last day or so, the Commission initiated a proceeding on digital audio broadcast, broadcasting with CD quality sound. We have been asked for 70 megahertz for that alone. For personal communications, we have been petitioned for 100 megahertz. Low earth-orbiting satellites for mobile services, 60 megahertz.

You add that up, and that is just what is in front of us now, you go past 200 very quickly. But we have not whittled those kinds of things down. That is why I like the notion of 200 as a target, and maybe sort of a lower minimum target is just about right.

Senator BURNS. I was interested in your statement about spectrum-sharing. I would hate to get in the shape here whenever the Secret Service and the President moves, every garage door in Washington, DC goes up.

I do not know whether that has any bearing on this or not, but I know that there is new technology, new engineering coming along every day that can block and slide and slice into a lot of those things. I thank you for your time today, and I find it very interesting and very challenging. Thank you.

Thank you, Mr. Chairman.

Senator INOUE. Thank you.

Thank you very much.

Our next panel consists of the Director, Command Control and Communications Systems, Joint Staff of the Pentagon, Lieutenant General James S. Cassity, Jr., the Executive Director of the Associated Public Safety Communication Officers, Mr. Robert Tall, President and General Manager, Communications Systems Group, Motorola, Mr. John Major, the Chairman of the Committee on Communications and Information Policy of the Institute of Electrical and Electronics Engineers, Dr. Robert Powers.

Gentlemen, I thank you for joining us this afternoon, and may I begin by calling upon General Cassity?

STATEMENT OF LT. GEN. JAMES S. CASSITY, JR., DIRECTOR, COMMAND, CONTROL, AND COMMUNICATIONS SYSTEMS, THE JOINT STAFF; ACCOMPANIED BY BILL COOK, DIRECTOR, NAVY ELECTROMAGNETIC SPECTRUM MANAGEMENT

General CASSITY. Thank you, Mr. Chairman, Senator Burns. I am Lieutenant General Jim Cassity, Director for Command, Control and Communications Systems for the Joint Staff, and I have presented a rather lengthy testimony for the record. I will be just hitting the high points on that. Today I represent the commanders of the unified and the specified commands, the military services war fighting forces, to bring their views on the vital need for adequate radio frequency spectrum. With me is Mr. Bill Cook, the Director of Navy Electromagnetic Spectrum Management, to assist me in the extreme technical areas.

First, I would like to briefly describe the military's dependence on the radio frequency spectrum. We brought along a chart that shows the current allocations and spectrum use.

As you can see, the upper band, or the red area, is reserved for commercial operations. The blue area is that portion reserved for the Government, and as you heard in earlier testimony, the overlapping white areas are shared spectrum.

As Ms. Obuchowski pointed out and I will reiterate, below 5 gigahertz, only about 12.9 percent of that spectrum is reserved exclusively for Government use. About 28.4 percent is reserved exclusively for commercial use, and the remaining 58.7 percent is shared both by the Federal Government and the commercial users.

The successful operation of key tactical and strategic communications systems, weapons control systems, navigational systems, surveillance and warning systems, and safety of life systems depends on the availability of adequate spectrum resources.

The anticipated scaling down of the overseas deployment of U.S. forces, the reduction of the military services and a reduced defense budget, the so-called peace dividend, will undoubtedly affect the tempo and the scale of military operations.

However, even in these times of relative peace, defense forces, even though they may be reduced, must be trained and exercised in their war fighting skills using radios, radars, satellites and other electronic equipments.

Dissolution of the Warsaw pact as a viable military opponent certainly reduces the need for the level of capability previously maintained, but the forces and weaponry have been partially replaced by the need for new and additional arms reduction/limitation sur-

veillance and monitoring tasks along with their supporting frequency-dependent sensors and command, control, and communications systems.

My next point, the fiscal implications of spectrum reallocation, also concerns us deeply. In the Department of Defense, we have evolved and refined frequency support for our equipment and our systems inventory over a long period of time. Many extra dollars have been spent to ensure compatibility and interoperability within our own joint forces, as well as with NATO and our other allies worldwide.

Each frequency band has propagation noise and other emission characteristics that are ideal for each system we build. Changing that frequency upon which a system operates requires both engineering analysis to find another band that is acceptable for use plus the administrative support to find that frequency gap where the newly-displaced system can be placed.

It is also very difficult to find that replacement frequency band, as has been pointed out earlier, and once the new band determination is made, additional engineering is required to redesign antennas, transmitters, receivers, employ filters and make other modifications to allow coexistence with the present systems.

The associated cost for the replacement, research, development, test, evaluation and fielding are considerable. So it is both a time consuming and costly process. I would be pleased to go into some of the details on specific systems during the Q&A period.

We are also acutely aware of the pressure from the civil sector for additional spectrum with which to improve, expand and develop innovative private public service and mass media systems. We also have shortages and experience interference from other bona fide spectrum users worldwide.

This brings me to my final point. I believe there is significant potential for making improvements within the current framework that would be of benefit to all of the spectrum users.

Already, the Federal Government cooperates with the civil sector in sharing frequencies within our allocated bands. Additionally, we work closely with the FCC and the civil sector in trying to accommodate new systems and services.

Increased accommodation will require careful joint study and review to ensure that any proposed agreement is workable. Such studies should not be limited just to taking Federal Government allocations. Rather, it must look at both Federal and commercial allocations and respective uses. It must continue to promote sharing, and it must extend its vision well into the future.

In the short term, sharing seems to be the only reasonable way to increase efficiency without drastically impacting civil or military operations. We in the DOD are committed to working with both the National Telecommunications & Information Administration as well as the Federal Communications Commission in arriving at an equitable solution to our mutual problem of the diminishing spectrum resource. Also, we would look to the NTIA and the FCC for leadership in developing a coordinated, cooperative, long-range view of joint spectrum planning and use.

My written testimony provides further details, plus some recommendations and administrative comments relating to the House

and Senate versions of this act. I believe these recommendations meet the purpose and the intent of the movement to realign the spectrum and broaden the effort so as to address the causes of the current spectrum use dilemma. We are willing to work with all agencies to meet the goals of this act, but we feel we must do so carefully and with the full cooperation of all concerned.

Thank you, Mr. Chairman and Senator.

[The statement follows:]

STATEMENT OF LT. GEN. JAMES S. CASSITY, JR., DIRECTOR, COMMAND, CONTROL, AND COMMUNICATIONS SYSTEMS, THE JOINT STAFF

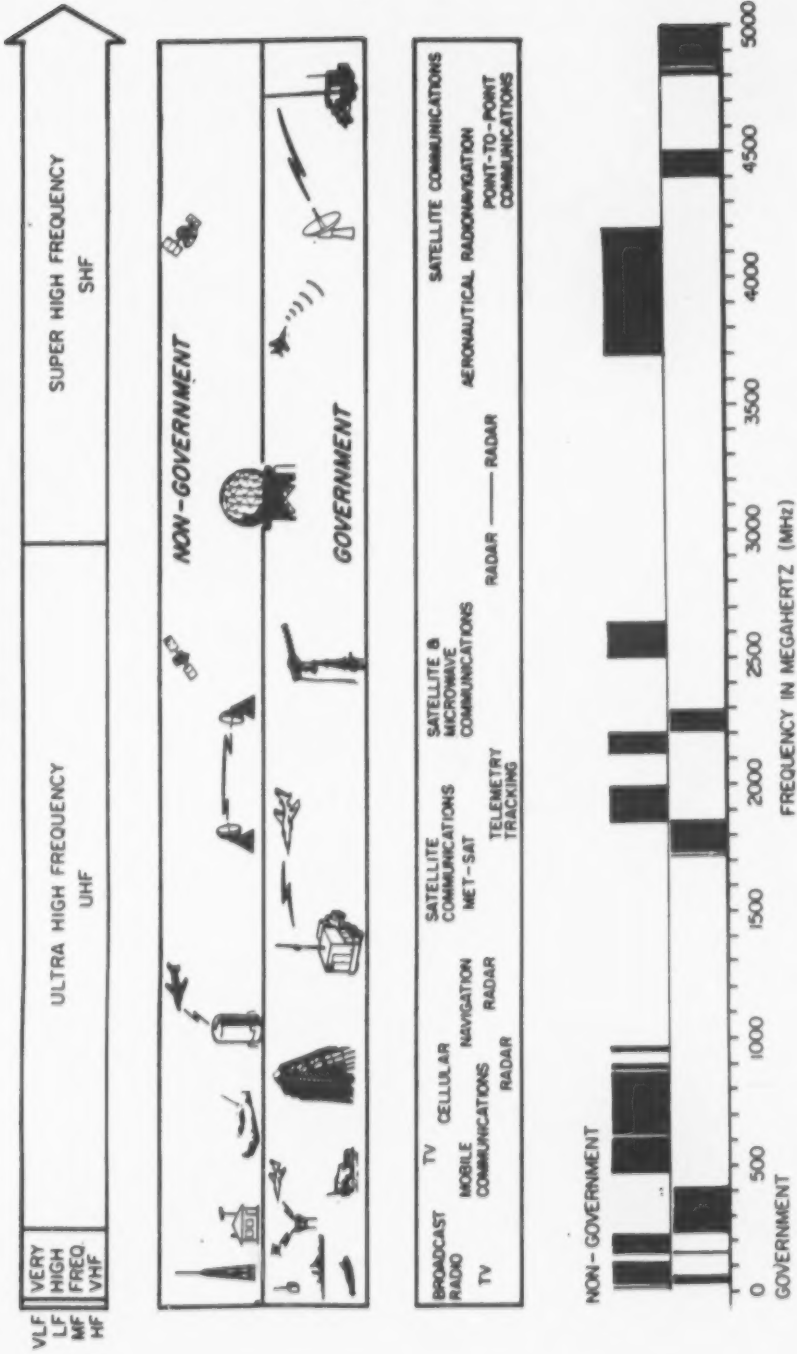
Good afternoon, Mr. Chairman, distinguished Members of the Committee.

I am Lieutenant General James S. Cassity, Director for Command, Control, and Communications Systems for the Joint staff, which oversees the extensive needs of our warfighting forces. Today, I represent the commanders of our worldwide unified and specified commands and the Military Services, the operators of the Department of Defense communications-electronics systems. I bring their views on the vital need for adequate radio frequency spectrum to operate these systems in maintaining the security of our country. I will also discuss the operational and fiscal implications of reallocating large segments of the spectrum. Lastly, I will present our views on improvements to the current allocation process which we believe will accommodate, indeed even promote, technological innovation and competitiveness. With me is Mr. William Cook, the Director of Navy Electromagnetic Spectrum Management, who will be able to answer technical questions regarding use of the spectrum by the Services.

First, I would like to briefly describe the Military's dependence on the radio frequency spectrum. We've brought along a chart that shows current allocations and spectrum use and, as you can see, the DOD simply does not have enormous portions of the spectrum reserved for our use. The DOD Services and agencies are also experiencing spectrum shortages in the US and worldwide, and interference from other bona fide spectrum users is an all too common occurrence. Since 1945, the Federal Government share of the spectrum has changed in favor of commercial uses. Today, in

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the 5GHz spectrum range, the Federal Government has only about 12.9% for its exclusive use, the commercial sector 28.4%, and the remaining 58.7% is shared by both Federal Government and commercial users. The DOD is the biggest users of the Federal spectrum, sharing it with all other Federal agencies. In short, the frequency assignments made to the Military Services are used, and are vital to national security.

The successful operation of key tactical and strategic communications systems, weapons control systems, navigation systems, surveillance and warning systems, and air traffic safety of life systems depends on the availability of adequate spectrum resources. For example, this spectrum supports NAVSTAR/GPS which provides a highly accurate worldwide navigation capability for military and civilian ships, aircraft, and other applications.

There are several systems in each spectrum segment. Therefore, no single system could be terminated to free up a band. Additionally, there is no segment that can be totally vacated without impacting the Military services' responsibilities and response capabilities. The anticipated scaling down of the overseas deployment of US Forces, a reduced Defense Budget, etc., - the so-called "Peace Dividend" - will undoubtedly affect the tempo and scale of operations by the Military Services in some specific geographic areas overseas. For example, in Greece the closing of a US Naval Communications station could release some spectrum to local authorities, but would do nothing to reduce our domestic needs as those ships use equipment that is also used back

here in the US for ship-to-ship and ship-to-shore communications. Likewise, regardless of the future of the B-2 manned strategic bombers, SAC will still carry out its strategic operations. Frequencies will still be required to support the communications and air traffic control radar systems that support these forces.

Some frequency bands are unique in their use for the DOD. For instance, the 420 MHZ band is key to our strategic missile defense systems due to its propagation characteristics. It is also the only such band which permits search radar operations in the spectrum below 5 GHz. If we were forced to relinquish that band, the US would be vulnerable and exposed until replacement systems could be developed.

Military unique, National Defense radio systems cannot be placed behind glass, with an "Open In Case Of Emergency" sign in the US Defense forces. In these times of relative peace, defense forces, even though they may be reduced, must be trained and exercised in their warfighting skills. And, unless full peace reigns throughout the world--which it does not--the DOD must anticipate, plan for, and be ready to respond to the alerts, deployments, limited engagements of forces, and mid-intensity conflicts which are likely to occur. The Warsaw Pact is crumbling, the Berlin wall is down, even the Soviet Union is facing serious internal dissension. But, it must be remembered that in the last 50 years there have been more than 380,000 US battle deaths incurred during 14 years of active warfare, none of which were inflicted by Warsaw Pact forces. The retirement of one

potential opponent, albeit our major one, does not relieve the Military Services from the responsibility of being ready for others. Congress has apparently realized this by advocating for a smaller Defense Budget, but not pushing for abolishing the National Defense capability as was the case following WW II.

While dissolution of the Warsaw Pact as a viable military opponent certainly reduces the need for the level of capability preciously maintained, the forces and weaponry has been partially replaced by the need for new and additional arms reduction/limitation surveillance and monitoring tasks, along with their supporting - frequency dependent - command, control and communications (C3) systems.

My next point, the fiscal implications of spectrum reallocation, also concerns me deeply. In DOD, we have evolved and refined frequency support for our equipment and systems inventory over a long period. Many extra dollars have been spent to ensure compatibility and interoperability with NATO and our other allies and within our own joint forces on a worldwide basis. Each frequency band has propagation, noise, and other emission characteristics that each system we build takes advantage of to maximize performance. Changing the frequency a system operates in requires both engineering analysis to find another band of acceptable characteristics and frequency administration support identify where the newly displaced system could be accommodated. In many cases it could take a very long time to find a replacement band. Once the new band determination is made,

additional engineering is required to redesign antennas, transmitters, receivers, employ filters, etc. to allow coexistence with present systems. The associated costs for the replacement research, development, test, evaluation, and fielding efforts could be significant.

- The AN/VRC-12 vehicular radio set that has been the backbone of Army and Marine Corps ground forces has a population of over 200,000 units Valued at over \$300 million. Its secure communications replacement, the Single Channel Ground to Air Radio (SINCGARS) has a planned program of 265,000 units. Its total R&D and implementation costs are estimated to be over \$3 billion, of which several hundred million dollars have already been awarded to US electronics firms now producing these radios.

- Vacating the 225-400 megahertz UHF band alone would cost over \$20 billion and from seven to ten years to replace the DOD inventory of air-ground-air, air traffic control, shipboard line-of-sight, and strategic forces satellite communications systems. In short, until a new spectrum could be found and new systems developed and fielded, the worldwide tactical communications systems of the Military Services would not exist in their present form.

- Displacing a low population, shipborne, air traffic control radar type such as the AN/SPN-43 would, in itself, cost from \$350-550 million and require 10 years of intense effort.

We are also acutely aware of the pressure from the civil sector for additional spectrum with which to improve, expand and

develop innovative private, public service and mass media systems. We sit on the committees that are now preparing for the 1992 World Administrative Radio Conference, the International Telecommunication Union forum which will consider spectrum allocations and realignments through the end of the century and beyond. We know, full well, of the emerging systems advocated by not only US industry, but those of Asia, the European Community, and many individual nations. This is as it should be, and we would not deny these innovators and entrepreneurs their opportunity to provide advanced, efficient systems and services. We maintain, however, that this does not have to be achieved at the cost of closing down the radio nets and systems vital to our Nation's defense.

This brings me to the final point that I would like to leave with you today. I believe there is significant potential for making improvements within the current framework that would be to the benefit of all spectrum users. Already, the Federal Government does cooperate with the civil sector in sharing frequencies in our allocated bands. Additionally, we work closely with the FCC and the civil sector in trying to accommodate new systems and services. Increased accommodation will, however, require careful Joint study and review to ensure that any proposed agreement is workable. Such studies should not be limited just to taking Federal Government allocations; rather, it must look at both Federal and commercial allocations and respective uses. It must continue to promote sharing, and it must extend its vision

well into the future. In the short term, sharing is the only reasonable way to increase efficiency without drastically impacting civil or military operations.

We in the DOD are committed to working with both the National Telecommunications and Information Administration (NTIA) and Federal Communications Commission (FCC) in arriving at an equitable solution to our mutual problem of the diminishing spectrum resource. Also, we would look to the NTIA and the FCC for leadership in developing a coordinated, cooperative, long range view of joint spectrum planning and use.

Therefore, we in the Military Services would ask that you consider the following recommendations as an approach to updating and improving the allocation of the radio frequency spectrum to spur the desired economic enterprise, innovation and competitiveness as well as continue to support the command, control and communications nerve systems of our National Defense.

- Consider a joint Federal/commercial review of spectrum use. This should be conducted with a view of identifying all spectrum available for re-allocation and/or shared use, by both Federal Government and commercial entities, not any single faction. With the available spectrum shrinking, and requirements growing, it is not the time for new, exclusive allocations.

- Relieve any unnecessary constraints on frequency sharing between Federal Government and commercial users as a means of increasing commercial access by the civil sector on the one

hand, and of facilitating Federal Government adoption of alternative commercial systems and services on the other.

- Call for establishing a regular, joint, spectrum use and management planning process. This should occur at least every five years and should project out for no less than 20 years.

- Include cost to the Federal Government as a criterion for identifying and considering frequencies to be reallocated.

- Provide for a period of three years as the deadline for any withdrawal of assignments from Federal users in order to ensure a more orderly transition.

- Allow the Secretary of Commerce to use or augment an existing Advisory Group or Council for advice regarding spectrum reallocation, associated processes and long range strategic spectrum planning. Appropriate Federal agency spectrum user representatives should be included.

In conclusion I would like to emphasize that I believe these recommendations would meet the original purpose and intent of the movement to realign the spectrum, and would broaden the effort so as to address the causes, rather than just the symptoms, of the current spectrum use dilemma.

The recommendations would achieve the desired results in a reasonable time period while also meeting the larger needs of all spectrum users.

These recommendations would also recognize the implications of major international events now in progress or planned; all of

which have tremendous potential impact on the DOD's ability to provide for national security with reduced resources.

Furthermore, this initiative would accomplish all desired actions at less cost and disruption to the taxpayer than would any isolated reassignment of an arbitrary number of frequencies to a limited community of interest.

All recommendations are within the existing charters and mandates of the cognizant Federal Government bodies, and the proposed approaches would provide guidance, stimulus, and a schedule for the system to function as intended.

Thank you, Mr. Chairman, and members.

Senator INOUE. Thank you very much, General. Now may I call on Mr. Tall?

**STATEMENT BY ROBERT TALL, EXECUTIVE DIRECTOR,
ASSOCIATED PUBLIC-SAFETY COMMUNICATIONS OFFICERS, INC.**

Mr. TALL. Thank you, Mr. Chairman, Senator Burns.

Your opening statement, Mr. Chairman, encouraged me greatly, because it included something that I was going to center my presentation on. You referred to the local governments as being one of the beneficiaries of the bill, and that was my prime point for wanting to testify today. The bill itself does not include that kind of emphasis.

I think the bill, as described in your opening statement, is a lot more satisfactory to us than it was without those words and the emphasis on local government.

I have the detailed numbers of local government radio systems that must be accommodated in my statement. APCO and several other organizations like ours have about 93,000 different radio systems that we have a role in keeping apart, keeping from interfering one with another.

In some of the metropolitan areas of the country we cannot shoe-horn another radio system in without causing interference to someone. I am talking about police, fire, special emergency radio systems. The New York Metropolitan Area is saturated. It is full. We are still called on to put in new systems and to modernize and expand existing systems, and we just cannot do it without hurting someone already there.

That, I think, is the gist of my testimony. I will go on if you would like me to, or I will answer questions.

[The statement follows:]

Statement of: Robert E. Tall, Executive Director
Associated Public-Safety Communications Officers

The Associated Public-Safety Communications Officers, Inc. (APCO) is pleased to support the intent of S. 2904, which looks toward the Secretary of Commerce identifying and making available to the Federal Communications Commission a large amount of spectrum from its exclusive government allocations for reassignment to the FCC for other purposes.

APCO hopes that as this process is implemented, the possibilities for improvement in the ability of states and local governments to cope with their increasing responsibilities through adequate spectrum allocations will be considered as well as will the possibilities for enhancing commercial opportunities.

We have no way of knowing whether 200 megahertz is the appropriate amount of spectrum to be so transferred after all requirements are weighed, but we do not dispute that amount. We do know that the state and local governments need more spectrum

than is currently available to them.

We are not convinced of the virtue of all of the proposed new technological developments which have been mentioned as wealth-generating possibilities in connection with this legislation, but neither do we discount them. The states, counties and municipalities of the United States also collectively have enormous buying power which could be exercised to benefit the gross national product if sufficient spectrum were made available to them.

In the field of public safety communications, we have seen swift technological developments in recent years: computer aided dispatch operations; automated vehicle location systems; public safety trunked communications systems; digitally addressed mobile radio systems; dynamic regrouping of public safety "talk groups" within our radio systems; and many other features designed to speed emergency response forces to the members of the public who need help, and to better deploy those forces when they reach the scene of emergency. There are as many more currently on the drawing boards in the public safety community as there are in any other sector of our society.

While each of these developments has been spectrally efficient in and of itself, each has added to the overall public safety

spectrum requirements because it has increased the reliance on radio, resulted in more and better communications, and has led to other technological improvements which have had the same effect.

APCO has no doubt that whatever amount of "new" spectrum can be put into the hands of our inventors will be exploited to the fullest. Further, we feel it is critical from the standpoint of our own public safety equipment suppliers, as well as other United States manufacturers, that they have enough spectrum resource to develop equipment and services to compete in the world markets.

We are concerned with some of the terminology used in this bill and the lack of specificity as to how state and local governments are regarded in the proposed legislation, notwithstanding the June 7, 1990 statement of House Telecommunications and Finance Subcommittee Chairman Edward J. Markey as he urged to his colleagues that the legislation "will provide for national security and public safety needs while fueling economic growth in this decade and beyond."

We know Chairman Markey and his colleagues are well aware of the urgent requirements of the state and local governments for additional spectrum in the major metropolitan areas of the United States, as are the members of this Senate Committee, and did not intend that these requirements lose any of their urgency as other

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United States needs are also attended to through this legislation.

A few additional words in S. 2904 would make this intent clear.

Though there may be Federal government military reductions and the resultant "peace dividend" which has been cited, there continues a very strong escalation of the direct "warfare" which is being waged in the United States by and with the criminal elements. There is thus no peace dividend at hand for the states and local governments, and no reduction in spectrum requirements.

One of the principal roles of government at all levels is to provide for the public safety of the population. Except for the national defense responsibilities of the Federal government, the protection of lives and property in the United States is largely a function of state and local governments.

The state and local governments are being increasingly burdened in their attempts to provide for the public safety of the citizens and their property. In this pursuit, they require the highest degree of support from the Congress and from all departments and agencies of the Federal government.

APCO urges that the priority status which Congress repeatedly has accorded to the spectrum requirements of state and local governments in the past be maintained in this legislation as the

intent of the legislation is carried forward.

APCO speaks from a perspective of 8,200 members who are employed by state and local governments to design, build, maintain and operate public safety communications systems, and by the commercial interests who supply the products and services for these systems. Established in 1935, APCO today has 41 Chapters in the United States and one in Canada, and members in a number of other countries. We are a not-for-profit association which has two subsidiaries, also not-for-profit: one devoted to radio frequency coordination, and one devoted to education and training.

The FCC-administered radio services in which our members are most interested are the Police, Fire, Special Emergency, Highway Maintenance, Forestry-Conservation, and Local Government Radio Services. Another area of high interest is in fostering the nationwide spread of Enhanced 9-1-1 Emergency Telephone Number Service. While the latter is not a spectrum issue, it begs for Congressional attention.

All land mobile radio began in our services with the early days of police radio, and we have remained at the front of technology over the years. For decades, public safety was the testing group for new developments, which when proven were transferred into other markets. In more recent years, APCO's "Project 16"

recommendations, under a study sponsored by the Department of Justice, included the specification of functional requirements which have spawned the present generation of sophisticated public safety trunked radio equipment, and its "Project 25" studies, currently being undertaken in partnership with the National Association of State Telecommunications Directors and representatives of a number of Federal agencies, are expected to set the standards for the next generation of digital public safety telecommunications equipment.

The International City Management Association reports that in 1987, there were in the United States, in addition to the 50 State governments, 3,042 County governments, 19,200 municipal governments; and 16,691 township governments.

Each one of these governments has, or needs, modern mobile radio communications systems for their police and fire fighting forces, at a minimum. They also need radio communications systems for their emergency medical service providers, their public works and highway departments, and a variety of other operations.

In addition, there were in 1987 14,721 school districts and 29,532 special districts, including fire districts.

In April, 1990 APCO's records showed that there were 19,305 governments licensed for police radio systems; 18,331 licensed

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fire radio licensees; 4,728 highway maintenance radio licensees; and 1,872 forestry and conservation radio licensees.

In addition to those service-specific radio systems operated by our State and local governments, there were 26,649 systems licensed in the Local Government Radio Service, which is open to all of the categories just mentioned.

Also in the general camp of public safety, there were 22,083 Special Emergency Radio Service systems. This is somewhat of a catch-all service but includes ambulance and emergency medical services, hospitals, doctors and others with responsibilities for providing critical services to the public.

These total 93,438 mobile radio licensees, ranging in size from very small systems to huge, complex systems such as operated by large city police or fire departments, or large state-wide communications systems.

There is still much growth ahead, in new systems and in expanded and modernised systems.

These State and local government operations have been recognized by the Congress as deserving of the very best consideration the FCC can give them in the way of spectrum allocations, and they are making the most efficient use of what they have.

FROM

11.19.1951 12:48

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What they have is not enough. Providers of public safety services to the public in the New York Metropolitan Area are at the bottom on the barrel. There are no more assignable channels for their use in the area. Every new system, or system expansion or modernisation in that area must come at the expense of interference to, or forced degradation of service by, another public safety operation. The only answer to the problem, following the Congressional mandates cited below, is for the FCC to make additional frequencies available to them. Public safety services in the Southern California area are in the same shape. Those in the Chicago and a number of other areas are too, or soon will be.

We realize that the FCC cannot assign frequencies where none exist, but there are steps that could be taken to provide relief to public safety agencies on a case-by-case basis, without adverse impact on anyone else.

We raise this matter in the context of this legislation because it is a Congressional direction to the FCC that we don't want to be lost sight of as S. 2904 is enacted. There is still work to be done under previous Congressional mandates that must be re-emphasized. We urge this Committee to remind the Commission of the priority status of public safety.

In amending the Communications Act in 1902, Congress adopted a

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new Section 331.(a) directing that: "In taking actions to manage the spectrum to be made available for use by the private land mobile services, the Commission shall consider, consistent with section 1 of this Act, whether such actions will - - (1) promote the safety of life and property. . ."

In the Federal Communications Commission Authorization Act of 1983, Congress directed, with respect to the use of funds regarding spectrum allocation and assignments for public safety purposes, that: ". . .Sec. 9.(a) Funds authorized to be appropriated under section 2 of this Act shall be used by the Federal Communications Commission to establish a plan which adequately ensures that the needs of State and local public safety authorities would be taken into account in making allocations of the electromagnetic spectrum. In establishing such a plan, the Commission shall (1) review the current and future needs of such public safety authorities in light of suitable and commercially available equipment and (2) consider the need for a nationwide contiguous frequency allocation for public safety purposes. (b) Pending adoption of a plan, the Commission, while making assignments and allocations, shall duly recognize the needs of State and local public safety authorities."

In Conference Report 97-765, Congress held that: "The Commission should be ever vigilant to promote the public land mobile

spectrum needs of police departments and other public agencies which need to use such radio services to fulfill adequately their obligations to protect the American public. (p.52) In adopting Section 5, it is the Committee's intent that the Commission proceed immediately to address the shortage problems, as well as any potential future problems confronting the public needs, assuming use of equipment which is suitable and commercially available when frequency allocations decisions are made."

The Senate Committee Report on the Communications Amendments Act of 1982 said: "radio services which are necessary for the safety of life and property deserve more consideration in allocating spectrum than those services which are more in the nature of convenience or luxury."

There are also steps which could be taken by the Commission to assist states and local governments in other areas. There is no single point of focus in the structure of the Commission that allows concentrated attention on fulfilling the priority role of the Commission in fostering the capabilities of the state and local governments to promote the safety of life and property through the use of wire and radio communications.

The escalating war on drugs, the rapid but nationally uncoordinated development of the 9-1-1 emergency telephone number, and the lack of adequate spectrum to meet the requirements of state and local governments, to mention a few situations, require that the Commission take steps to identify and remedy relevant deficiencies in its present regulatory approach, and to carry out the clear intent of Congress that public safety telecommunications requirements of the state and local governments be met.

Senator INOUE. Thank you very much, Mr. Tall. May I now call on Mr. Major?

STATEMENT OF JOHN MAJOR, PRESIDENT AND GENERAL MANAGER, COMMUNICATIONS SYSTEMS GROUP, MOTOROLA

Mr. MAJOR. Mr. Chairman, Senator Burns, I appreciate the opportunity to appear before you today. I am John Major, Senior Vice President and General Manager of the Communications Systems Group at Motorola.

The systems we sell are used worldwide by public safety utilities and industry. I am proud to say our radio systems are major success stories for exports. I also serve as Chairman of the Land Mobile Division of the EIA and TIA.

I commend you and your colleagues for moving to identify and secure additional spectrum so that American consumers, industry and public safety can benefit from advanced telecommunications products and new services.

The link between spectrum availability and international competitiveness in new technologies is critical if we are to retain our leadership in land mobile and satellite communications. Until radio frequencies are allocated, and allocated quickly, we will impede the introduction of spectrum-dependent technologies in the U.S. market. That would be very unfortunate indeed, because this is an arena where the U.S. now leads.

Our challenge is to continue to lead. Our policies to date have fostered the growth of world-class successes in television, radio, and in my area of expertise, public safety, paging, cellular and shared mobile radio systems as well as industrial radio communication systems. Today, we enjoy the very best of each of these. These systems not only make us more efficient as we transact our business, but they have also allowed us to develop our products that are highly successful exports.

While it is comforting to know that we have led to date, it is the challenge of the leader to continue to lead. As the competition has heated up, as the world has come to recognize the benefits of successful wireless communications industry for both industrial efficiency and as an export opportunity, we are faced with the challenge as perhaps never before.

The facts are that our leadership will be lost if we do not act quickly and decisively. Allow me to first sketch out what is at stake. As we see it, the entire wire communications industry is changing to wireless. Globally, the telecommunications world today is \$462 billion. By 2010, the telecommunications world will be \$3.2 trillion. By 2010, a substantial portion of that will be wireless. Without spectrum, the U.S. communications industry will become backward instead of pace-setting.

Mr. Chairman, I have five points to make:

First. The timetable for identifying spectrum for reallocation must be shortened. Europe and Japan have already begun to reallocate spectrum for land mobile services with new technologies, including PCN, CT-2, DECT and Shared Radio.

Second. We need to recognize the important contribution and progress land mobile and satellite communications have made over

the last 40 years. I would challenge that these contributions are more than any other medium or industry. It is the industry that has produced cellular phones, paging, and unparalleled radio systems for public safety and industrial communications.

Third. We need to support efforts to formulate a land mobile allocation plan at WARC 1992. Today, we have no plan for existing or new services.

Fourth. We need to continue to ban spectrum auctions. Should auctions go into effect, they would have an immediate dampening effect on technological advancement. That is not to say that strategies should not be developed to assure that groups that are yielding spectrum should not in some way see benefits for their willingness to do so. We need beneficial solutions that work to everyone's advantage. What we do not need are auctions.

Finally. The changes and impacts of the current wireless world are dramatic. Who has not been impressed by the power of a Motorola Micro Tac to bring the world to you wherever you may be, whenever you may need it?

However, these are only the barest indicator of what is yet to come. In the future, everyone will be in touch with everyone, both to speak to each other and to see each other.

All information that is needed for any decision will be available on request. Decisions will be made faster, misunderstandings will be resolved more quickly, and the need to lose time in travel will be decreased and public safety effectiveness will be dramatically enhanced.

It will be a new world of convenience and openness that will not only offer staggering personal and business benefits but which will also support a massive industry for U.S. and world consumption.

It is not a secret that other countries place a very high value on land mobile and its contributions to society. Japan has publicly announced its plans to reallocate 600 megahertz of spectrum for new and existing mobile commercial applications.

The severity of the crisis we face can be exemplified by contrasting where the U.S. stood prior to the 1979 WARC and where we stand today. Preparation for the 1979 WARC began in earnest in 1975. As a result of our head start, we had products and systems with which we could access worldwide cellular and trunking markets. The U.S. led the technology and others copied.

Similarly, shared trunking has been introduced into Japan, the U.K. and Mexico among other countries. Motorola's shared trunked systems in Japan are so successful that they are nearly fully utilized as quickly as they can be installed.

In looking at WARC 1992, in terms of status we find just the opposite has occurred. As important as spectrum is, we have yet to formulate an allocation plan.

Mr. Chairman, we appreciate the opportunity to express support for your legislation.

[The statement follows:]

Testimony of

JOHN MAJOR

Senior Vice President and General Manager
Communications Systems Group
Motorola, Inc.

Mr. Chairman, members of the subcommittee, I appreciate the opportunity to appear before you today to present testimony on S 2904, the Emerging Telecommunications Technology Act of 1989.

I am John Major, Senior Vice President and General Manager of the Communications Systems Group at Motorola. My specialty is the area of land mobile radio systems. The group of Divisions that I manage at Motorola develops and sells systems for private and shared radio systems. The systems that we sell are used worldwide by public safety, utilities and industry. I'm proud to say that our radio systems are a major success story for exports. I also serve as Chairman of the Land Mobile Division of the Telecommunications Industry Association and Electronics Industry Association.

We commend you and your colleagues for moving to identify and secure additional spectrum so that American consumers, industry and public safety can benefit from advanced telecommunications products and new services. The link between spectrum availability and international competitiveness in new technologies is critical if we are to survive and

retain our leadership in land mobile and satellite communications. Unless radio frequencies are allocated and allocated quickly, we will impede the introduction of spectrum dependent technologies to the U.S. market.

That would be very unfortunate because this is an arena where the U.S. now leads. Our challenge is to continue to lead. Our policies to date have fostered the growth of world class success in Television, Radio and in my area of expertise Public Safety, Paging, Cellular and Shared Mobile Radio and Industrial radio communications systems. Today, we enjoy the very best of each of these.

These systems not only make us more efficient as we transact our business, but they have also allowed us to develop products that are highly successful exports. While it's comforting to know that we have led to date, it's the challenge of the leader to continue to lead. As the competition has heated up, as the world has come to recognize the benefits of a successful wireless communications industry for both industrial efficiency and as an export opportunity, we are faced with that challenge as perhaps never before. The facts are that our leadership will be

lost if we don't act quickly and decisively.

Allow me to first sketch out what's at stake. As we see it, the entire wired communications industry is changing to wireless. In the U.S., the assets of that industry can be valued at \$242 billion. In '89, that industry employed some 680 thousand people. It invests on the order of \$20 billion yearly and has annual revenues around \$89 billion. There are 1.7 billion telephone conversations each day.

Globally, the telecommunications world today is \$462 Billion. It's growing at approximately 10% per year and will continue to average that amount of growth through 2010. By 2010, the telecommunications world will be \$3.2 Trillion dollars. By 2010, a substantial portion of that will be wireless.

Without spectrum, the U.S. communications industry will become backward instead of pace setting. Without spectrum, that industry will not be able to offer the new services that will allow the industrial efficiencies that we will need. Without spectrum, it will no longer be possible to develop products in the U.S. for export globally. Let me emphasize that last point. It is already true that some of our most

advanced technologies are being developed exclusively for overseas markets because there is no U.S. Spectrum for these services. As examples, a new shared radio service for Japan and a new telephone service for a number of countries.

Mr. Chairman, I have five points to make in my oral presentation to you:

NUMBER ONE. The time table for identifying spectrum for reallocation must be shortened. Europe and Japan have already begun to reallocate spectrum for land mobile services, including PCN, CT-2, DECT, Shared Radio and the like. Japan is in the process of reallocating 600 MHz for new and existing mobile commercial applications. The U.K. is making at least 200 MHz available for land mobile communications.

This means U.S. investment goes off shore -- to Europe and Japan because that is where the spectrum is. It also means that U.S. industry will not have the benefit of the efficiencies brought on by improved communications. Time has run out. We must move now to reallocate spectrum.

NUMBER TWO. We need to recognize the important contributions and progress land mobile and satellite communications have made over the last forty years -- I would challenge that these contributions are more than any other medium or industry. It's the industry that has produced cellular phones, paging, and unparalleled private radio systems for public safety and industrial communications. It is the users of those technologies, whether they be the public safety community, or industry, that are running out of spectrum in the U.S.

NUMBER THREE. We need to support efforts to formulate a land mobile allocation plan at the WARC 1992. Today we have no plan for existing or new services. As a result, U.S. worldwide participation will be constrained since a supportive U.S. based market will not be developed.

NUMBER FOUR. We need to continue to ban spectrum auctions. Should auctions go into effect, it would have an immediate dampening effect on technological advancement. Surely,

"deep pockets" should not be taken to qualify as satisfying the public interest. That's not to say that strategies shouldn't be developed to assure that groups that are yielding spectrum shouldn't in some way see benefits for their willingness to do so. We need beneficial solutions that work to everyone's advantage. What we don't need are auctions.

NUMBER FIVE. The changes and impacts of the current wireless world are dramatic. Who hasn't been impressed by the power of a Motorola MicroTac to bring the world to you where ever you may be whenever you need it. However, they are only the barest indicator of what is yet to come. In the future, everyone will be in touch with everyone both to speak to each other and to see each other.

All information that is needed for any decision will be available on request. Decisions will be made faster, misunderstandings will be resolved more quickly, the need to lose time in travel will be decreased and public safety effectiveness will be dramatically enhanced. It will be a new world of convenience and openness that will not only

offer staggering personal and business benefits, but which will also support a massive industry for U.S. and world consumption.

It is not secret that other countries place a very high value on land mobile and its contributions to society. Japan has publicly announced its plans to reallocate 600 MHz of spectrum (in the 1-3 GHz band) for new and existing mobile commercial applications.

The U.K. is making available at least 200 MHz for land mobile communications -- Microcell Services, and Personal Communications Networks (PCN) being two examples. In addition, there are currently many different programs in Europe related to mobile and personal communications. All of these programs will require spectrum allocations at some point.

Near term programs in Europe include Pan European Digital Cellular with an allocation of 50 MHz, Europe-wide and Cordless Telephone 2 (CT-2) with an allocation of 4 MHz in the U.K. Germany and France are also considering similar allocations for CT-2. The U.K. activities on PCN

alone envisage an allocation of about 100 MHz. France and Germany have also expressed interest in PCN.

What happens if the U.S. does not act quickly enough to accommodate our existing and future spectrum needs? In six words: We will cease to be competitive. We won't be able to compete for the products that will offer these services and our industries will not benefit from the efficiencies that will be made possible by these services.

Current U.S. land mobile spectrum allocations only respond to serve today's services and even here can often deliver only an unacceptable grade of service. There is limited focus on new functions and services.

Should this "short sightedness" continue, we will no longer be able to compete with foreign countries which are directing and dedicating spectrum resources to mobile communications that will provide corresponding increases in productivity in manufacturing and service industries.

The severity of the crisis we face can be exemplified by contrasting where the U.S. stood prior to the 1979 (WARC) and where we stand today. Preparation for the 1979 WARC began in earnest in 1975 with the allocation to land mobile of 115 MHz in the 800 MHz band. In fact, however, this allocation was initiated in the late 1960's and it was then that our research and development started. Analog cellular systems and private trunking systems were developed. Thus, when in 1979 this band was made available for land mobile throughout the world, U.S. industry was ready.

As a result of our head start, we had products and systems with which we could access worldwide cellular and trunking markets. The U.S. led the technology and others copied. In cellular, the U.K., Canada, Mexico and other Latin American countries adopted U.S. standards. Others followed suit.

Shared trunking has been introduced into Japan, the U.K. and Mexico, among other countries. Motorola's shared trunked systems in Japan are so successful that they are nearly fully utilized

as quickly as they can be installed!

In looking at WARC 1992 preparation, we find just the opposite has occurred. The Europeans and Japanese have allocated ample amounts of spectrum for DECT, PCN, RACE, and to accommodate the growth of existing services. The U.S., however, has not gone beyond agreeing to a Mobile WARC and has just issued an FCC Notice of Inquiry (NOI). As important as spectrum is, we have yet to formulate a current allocation plan for land mobile or for new services.

What new and exciting technologies might we miss should spectrum continue to be limited?

Visualize with me, if you will, if a watch commander could see and have a record of what his patrolman is seeing. Or imagine business meetings that can be set up without the participants needing to get together - where they can each see each other as they talk and exchange ideas. Or picture a business phone that moves with you even into meetings, if you've told it to allow a certain very important call to come through to you. Or if people with heart conditions could be continuously monitored.

In other words, picture a whole new world of fixed communications and the benefits in understanding, speed and safety that will flow from it.

Now for some nearer term specifics:

IRIDIUM -- Last month we unveiled a new era in personal communications - a global communications system that will allow people to communicate by telephone anywhere on earth, whether on land, at sea or in the air - via portable cellular radiotelephones operating as part of a satellite based system. The heart of Iridium is a constellation of 77 satellites in low-earth orbit working together as a digital switched communications network in space. It will handle both voice and data.

ARDIS - On January 30, Motorola and IBM announced the formation of a new joint venture company, ARDIS, that will provide the first commercially available nationwide advanced radio data information service. This service will allow companies to provide their mobile workers interactive access to computer data bases and

Information systems via two-way radio data terminals. In essence, it takes the personal computer out of the office and places it in a car or briefcase, replacing the wire with two-way radio.

Field service personnel and sales professionals are targeted users of ARDIS. Airlines, insurance representatives, realtors and brokers can use hand-held data terminals to enter orders and respond to inquiries with more accurate and timely data. Courier, messenger and other pick-up and delivery operations can substantially improve productivity and responsiveness with dispatch applications.

In addition, public safety agencies, security firms, news media, legal professionals, manufacturers, wholesale and retail distributors, medical professionals, utilities and public information networks and others are among the potential benefactors of the power of computer solutions designed to meet the needs of the mobile worker in a wireless environment.

SMART CARS/SMART HIGHWAYS -- This area of advanced technology for use in Smart Cars/Smart

Highways is of great interest to Motorola and Detroit. Advances in communications, computers and control process technology make this a real possibility. The development of this type of system provides the U.S. with both an opportunity and a challenge. The opportunity is to employ research that will help us reduce traffic congestion and improve safety. The challenge is to move forward rapidly to avoid the potential loss of yet another technology-based opportunity to foreign competition.

Extensive activities are occurring in Europe and Japan where vehicle manufacturers and electronics companies, with the cooperation of their national governments, are investing heavily in the development of these types of systems. (The European PROMETHEUS program alone will spend \$700-\$800 million over the next five years.) Smart cars and smart highways will make commuting more efficient and will make it unnecessary to build more highways.

In the U.S., the system has two major parts. The first consists of both sensor networks that will detect traffic densities and vehicle speeds, and traffic control centers that will monitor this information and communicate it to the driver.

The second element is a navigation/route guidance system on board the car. This service is important because it will provide realtime information on current traffic and highway conditions to both drivers and traffic control centers which will greatly enhance our ability to address the problems of congestion and safety.

Mr. Chairman, we appreciate the opportunity to express support for your legislation. As a corporation, we are eager for spectrum to be reallocated. To that end, we will continue to be available to you and your staff and appreciate the opportunity to assist you in any way. We are committed to taking the necessary steps to making the legislation a reality.

Thank you.

Senator INOUE. Thank you very much, Mr. Major. Dr. Powers?

STATEMENT OF DR. ROBERT POWERS, CHAIRMAN, COMMITTEE ON COMMUNICATIONS AND INFORMATION POLICY, INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS

Dr. POWERS. Thank you, Mr. Chairman, Senator Burns.

My name is Robert Powers, and it is a pleasure to appear here on behalf of the IEEE. I am employed by MCI Telecommunications Corporation, but I am appearing here today entirely in my IEEE capacity.

The potential benefits of S. 2904 to the economic and technical development of U.S. industry are of great importance, and they are definitely in the public interest. Therefore, IEEE supports this bill and encourages its early passage.

We concur that there exists within the Government allocations spectrum that would receive more effective use if it were made available to the private sector. We anticipate innovative applications which would enhance the global competitiveness of U.S. industry as a whole. In my oral presentation, I will concentrate on some ways in which such transfers can be made possible.

It is widely held that significant amounts of spectrum allocated to the Government are underutilized. One example of this view is that in a particular satellite service in the 7 and 8 gigahertz band, Government utilization is estimated to be less than 1/10th that of the commercial sector, largely because of satellite spacing issues.

In another case, some military mobile radio services still use 50 kilohertz channel band widths, whereas similar private sector users have long since gone to 25 kilohertz and are now moving to 12½ kilohertz as the technology permits, an improvement by a factor of four.

Aside from straightforward band width efficiency such as just mentioned, a second way to improve spectrum use depends upon technologies for sharing among multiple users. The technique that was just mentioned called trunking, for example, is used by both the cellular phone service and the so-called specialized mobile radio services.

The idea of trunking is that instead of assigning a single channel to a single user so that that channel is idle when the user does not need it, a group of channels is shared among a much larger group of users. This is the same idea as the sharing of a relatively small number of telephone lines by the entire population of the United States.

This trunking technique has been used in the private sector for about two decades, but it is just now being addressed by the Government. The Government did not use these techniques in the past simply because it did not have to. There was enough Government spectrum not to make it necessary. That leaves us at the present time with a fine opportunity to free up spectrum for transfer to the private sector.

Still a third way to increase overall spectrum efficiency and free up spectrum for innovative uses is, of course, for the Government to obtain more services from the private sector. In our written tes-

timony, we mention examples of how private sector frequencies and services were used effectively by Government agencies in such emergencies as Hurricane Hugo and the San Francisco earthquake.

There are other opportunities for increasing overall spectrum efficiency by moving Government users to private sector services. For example, routine mobile radio communications, possibly micro wavelengths dedicated to specific Government services such as the FAA and TVA for that matter, and functions performed by the Defense satellite communications systems which may not have unique military necessity.

All this being said, we do not want to leave the impression that we think the Government makes no serious effort towards spectrum efficiency. The Interdepartment Radio Advisory Committee, the IRAC, which coordinates spectrum use by Federal agencies and was mentioned this afternoon by Ms. Obuchowski, makes considerable effort to coordinate efforts and needs early in the planning process.

Likewise, the significant amount of spectrum shared between Government and non-Government users is a good example of the cooperative atmosphere that is often manifest between the FCC and the NTIA and the IRAC. These efforts should, and I am sure will continue. As we have heard already this morning from both NTIA and the FCC, they are both enthusiastic about doing that and it is very valuable.

Our major conclusions are these three: (1) The Government should be required to rely more heavily on the private sector for provision of both routine and emergency services where reserved spectrum is not absolutely essential for the national security; (2) we support the proposal for a private sector advisory committee to assist in the selection of frequencies to be reassigned. We further suggest that the committee be strengthened by including members of the academic and professional communities. Organizations such as the IEEE and others mentioned in our written testimony should be invited to contribute active members; and (3) we strongly support, in our third conclusion, the central idea of the bill—the transfer of significant spectrum from the Government sector to private sector use—and we believe that can be done without harm to Government communications functions.

Thank you very much for the opportunity to voice the support of IEEE U.S.A. for the Senate bill.

[The statement follows:]



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STATEMENT OF DR. ROBERT POWERS, CHAIRMAN, COMMITTEE ON COMMUNICATIONS AND INFORMATION POLICY INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS-- UNITED STATES ACTIVITIES

ON
S.2904: EMERGING TELECOMMUNICATIONS TECHNOLOGIES ACT OF 1990
before the
U.S. SENATE
SUBCOMMITTEE ON COMMUNICATIONS
COMMITTEE ON COMMERCE, SCIENCE AND TRANSPORTATION

August 2, 1990

Mr. Chairman and members of the subcommittee:

My name is Robert S. Powers, and it is a pleasure to provide testimony today on behalf of the IEEE. I am employed by MCI Telecommunications Corporation but am appearing here today entirely in my IEEE capacity.

I currently chair the Committee on Communications and Information Policy of IEEE's United States Activities Board. IEEE is the world's largest engineering society representing over 315,000 members worldwide, of whom approximately 250,000 reside in the United States. The IEEE seeks to advance the fields of electrical, electronics, and computer engineering by disseminating scientific and technical information on a global basis.

The potential benefits of S.2904 to the economic and technical development of U.S. industry are of great importance and are definitely in the public interest. Therefore, IEEE supports this

IEEE-USA, 1828 L Street, NW, Suite 1202, Washington, DC 20036-5104

The Institute of Electrical and Electronics Engineers, Inc.

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bill and encourages its early passage. Action on the bill should not be delayed pending completion of the NTIA "Comprehensive Policy Review of Use and Management of the Radio Frequency Spectrum."

We concur that there exists spectrum within the government allocations that would receive more intense and widespread use if that spectrum were made available for non-government use. If appropriate frequencies were made available to the private sector, we would anticipate innovative and productive applications which would have potential for enhancing the global competitiveness of U.S. industry.

We believe that it is imperative that the regulatory process and resultant spectrum allocations support the efficiency and the competitiveness of both the U.S. telecommunications industry and other U.S. industries that rely on telecommunications services. A sound spectrum structure to support equipment manufacture as well as telecommunications services is essential to U.S. competitiveness in the international marketplace.

It is widely held that significant amounts of spectrum held by the U.S. government are underutilized. One example of this view is in the relative utilization of orbital space and equivalent frequency spectrum by industry and the Department of Defense for satellite communications. In the seven and eight gigahertz band, for example, the government utilization is estimated to be less than one-tenth that of the commercial sector.

In another case, military mobile radio services use 50 kilohertz channel bandwidths, whereas similar private sector users have long since gone to 25 kilohertz bandwidths and are now moving to 12.5 kilohertz--an improvement by a factor of four.

- 3 -

A specific example of motion toward still more efficient spectrum use in the private sector is seen in present efforts to increase the spectrum efficiency of the cellular mobile radio service. There, the FCC and the private sector are moving toward digital modulation techniques in order to use less spectrum per telephone conversation -- by a factor of three to six.

A different type of spectrum efficiency relies not on channel bandwidths alone, but on efficient technologies for sharing among many users. The private sector's Specialized Mobile Radio Service provides a good example. Here instead of each user entity having its own FCC license and radio system, many users buy service from a single provider. Thus, the same spectrum can be used at different times by different parties for different purposes.

The recent experience of the commercial telecommunications industry in restoring communications services to the disaster areas affected by hurricane Hugo and the San Francisco earthquake may provide the Federal Emergency Management Agency (FEMA) a cost effective alternative to reserving special government spectrum allocations for this purpose. In this instance, transportable voice and video transmission facilities were in place and operating within hours of the events. They worked so well that FEMA requested continued use of these facilities after the news media had completed their use of them.

I would be remiss if I did not call attention to government efforts toward better utilization of the spectrum. In particular, I would recognize the planning efforts made within the Interdepartment Radio Advisory Committee (IRAC) to coordinate the needs of federal agencies. IRAC makes considerable effort to coordinate these needs early in the planning process for spectrum assignments.

Likewise, the significant amount of spectrum shared among government and the commercial sector is a good example of the cooperative atmosphere that is often manifested between the FCC and the NTIA and the IRAC. The successful operation of commercial satellite systems and government radiolocation systems has been accomplished in the 5.850 - 5.925 gigahertz frequency band as a result of this cooperation.

The conclusion to be drawn is that there are at least three good ways to effectively increase the spectrum available to the private sector: (a) improved bandwidths utilization; (b) spectrum transfer from the government sector; and (c) increased government and private sector sharing of spectrum.

Our major conclusions are these three:

1. The government should be required to rely more heavily upon the private sector for the provision of both routine and emergency communications services that are not absolutely essential for national security.
2. We support the proposal for a private sector advisory committee to assist in the selection of frequencies to be reassigned from government spectrum allocation. We strongly suggest, however, that the advisory committee be significantly strengthened by including members of the academic and professional community. Organizations such as the IEEE, the Institute for Aeronautics and Astronautics, the American Electronics Association and the Telecommunications Industry Association should be invited to contribute active members.
3. We support the central idea of the bill, namely the transfer of significant spectrum from the government sector to private sector use.

In summary, the IEEE strongly supports the passage of this legislation for frequency reallocation from the government to the commercial sector. IEEE believes that timely passage of such legislation, will lead to significant reallocation to the commercial sector, carries great potential for increasing the competitiveness of U.S. industry.

Thank you for the opportunity to voice the support of the IEEE-USA for the passage of S.2904.

Senator INOUE. Thank you very much, Doctor.

General Cassity, what do you think of Dr. Powers' recommendations that the Government can make more efficient use of the spectrum, could allow more sharing or use of the spectrum with the private sector?

General CASSITY. Well, sir, just as two quick examples of using the private sector, if you will, the hand-held radios that were used a few years ago were just that—radios that employed a part of the spectrum. We are now using commercial cellular radios in Washington and the Colorado Springs area, where I was assigned a few years ago.

We contracted with a commercial firm for NORAD, the North American Aerospace Defense Command, the U.S. Space Command, the Air Force Space Command, and the Air Force Academy to lease a cellular system that was put in by a commercial company, using commercial frequencies. So, we do indeed use the commercial sector a great deal and we do continue to look for ways to share.

The area that we disagree is that of making a major portion of the spectrum reserved for the Government, which is somewhere in the neighborhood of 600 megahertz. The proposal is to take one third of that and pass it on to the public sector; that would cause some extreme difficulties.

We are not suggesting that some of the older uses of the spectrum are the most efficient. But, on the other hand, when you look at some of the up-link and down-link satellite services that we are using, satellites that include communications satellites and sensors, replacing and finding a new frequency for those would take a long time and literally billions of dollars. These actions could not be done in 6 months, for sure, and certainly would be terribly expensive.

Senator INOUE. Are all of your frequency bands used at this time?

General CASSITY. Yes, sir, they are used. Now, as was pointed out, some of the bands are not used to the extent that others are, but when they have to be used, it is rather important to have them available. Examples of these are the frequencies that we use for the strategic submarines, airplanes, and missiles. It is terribly important to have those in reserve and to have them available for use, and exclusively for the use of emergency action messages and those kinds of things.

Senator INOUE. In the House hearing I believe you testified that reduced Defense activities would require more frequencies?

General CASSITY. There is a potential, sir, as we look at the sensors that may be employed to monitor treaty compliance by Russia. We do not know exactly what sensors we are going to be using, or if there is going to be more, as we look at frequencies that may be needed to transmit the information and to allow our people on site to talk back here.

The question that I responded to at the House hearing was the fact that with the reduced tensions in the world and with the Warsaw Pact crumbling and the Berlin wall taken down, the expectation is that we would not need all the frequencies, but we do indeed continue to need frequencies. Ship-to-shore radio, for example.

Although we may be leaving the Island of Crete and the naval base there, the ships that move from there back here still have the same radios. Replacing those radios here, ship-to-shore, as well as the shore-based radios, takes a new frequency.

Senator INOUE. How do you think we can use the spectrum that is not fully utilized at this time? Is there any way we can do that?

General CASSITY. Well, sir, I think we do a fairly reasonable job of using the spectrum. On the other hand, we regularly work with FCC in the more efficient use of spectrum, and as a matter of fact since the end of World War II, when we had about 40 percent of the spectrum, more and more of the spectrum has been turned over to the FCC and to the commercial users, and so I would anticipate that we would continue to make frequencies available in smaller pieces that can be accommodated.

Where we have problems is to give up 200 megahertz, or 33 percent of the frequencies that we have right now, and the problem, of course, is which frequencies are chosen. You talked about that earlier, as to the value of some as opposed to others that are not utilized as much. Obviously, we could give up some frequencies here and there, but I do not think it is reasonable to look at one-third.

Senator INOUE. Realizing that much of the activities of the military are classified, we cannot discuss the use of the spectrum, but is there any way we could include people from the private sector to come in and assist the military to make better and more efficient use of the spectrum?

General CASSITY. Yes, sir. And as a matter of fact, most of the equipment that the military has, we have acquired or caused the private sector to acquire for us. And that includes the uplinks and downlinks of satellites, as well as most of the radio systems we use. So, we regularly depend upon the private sector for a more efficient use of our spectrum.

Senator INOUE. Mr. Tall, in your testimony, you suggested that the city of New York has no space whatsoever.

Mr. TALL. Yes, sir, in the current mobile radio allocations are all available.

Senator INOUE. Is that the situation in all metropolitan areas?

Mr. TALL. It is worse in New York and Southern California. But Chicago is not far behind. Southern Florida is not far behind, and I would say, right now, in the top dozen cities we are desperately hurting.

Senator INOUE. Would you describe this as a crisis?

Mr. TALL. Yes, sir, indeed, I would. And an impending crisis. Certainly, a crisis now in the New York and Southern California areas. And a soon-to-be crisis in the other metropolitan areas.

Senator INOUE. Do you believe that the cities and states are using their spectrum wisely and efficiently?

Mr. TALL. Yes, sir, indeed, I do. We are using the latest equipment on the market when we can get it. Our cities and our states have, as the Federal Government has, a budget problem. And the size of some of our communications systems precludes the overnight replacement. It takes a long series of budgeting for a sizable city to replace a communications system.

We are headed that way. We are leading in the technology for mobile radio, as the public safety field generally has over the years,

within our capabilities. We are using trunked radio systems. We are engaged right now in a study with the federal agencies and the state telecommunications directors to set standards for new, advanced digital mobile radio systems for public safety.

In that effort, we hope to come up with a product that everybody can use—all government agencies can use, and provide for some level of interoperability. As General Cassity has pointed out, interoperability is the key to successful radio operation not only for the pure military, but in a tactical police operation also, or in a large-scale disaster. That is one of the directions that we are headed toward in our new advanced technology studies.

Incidentally, we have asked the Senate Judiciary Committee to look fondly on that effort with a little bit of financial support. We have no funding to do this. And we have received some encouragement from them.

Senator INOUE. Mr. Major, how would you compare the allocation system or process in the United States to that of Japan and the European Community?

Mr. MAJOR. Until very recently, it was very favorable for our approach. I mean our systems are the best. And my businesses are global. But the world has changed very quickly in the past two years. It is a matter of national policy in Japan to have world leadership in radio. And they are moving smartly and deliberately towards doing that. And plan to move users to other bands or to other solutions aggressively in order to accomplish.

It is exactly the same attitude in Europe. It is not the situation we had three years ago. They are all talking massive amounts of spectrum, and they all see it as a huge opportunity for local industrial efficiency, as well as for export. We will participate in those markets. We will lead in those markets.

Senator INOUE. You do not think that this is the policy in the United States?

Mr. MAJOR. No. Our system of squeezing every bit of the below a gigahertz spectrum out that we could do worked well for a very long time. Our cellular systems are the best. We have by far the best public safety systems, but for some reason we have run into a wall in allocations above a gigahertz. We do not seem to be able to work our way through it.

Senator INOUE. And we are suffering as a result.

Mr. MAJOR. The best systems, the newest systems I am developing today are being developed for foreign markets. One is being developed for Japan, a 1.5 gigahertz trunk system. Another that comes to mind is a Telepoint system for Far Eastern countries and the U.K.

Senator INOUE. From your background and your knowledge, would you say that the Government of the United States is an efficient user of the spectrum?

Mr. MAJOR. No, the Government is not efficiently using spectrum. But I have to offer that part of the issue here is it is hard to get information to judge that.

Senator INOUE. Dr. Powers, you have been with the FCC and the NTIA. Do you believe that the spectrum allocation process can be improved?

Dr. POWERS. Yes, sir, I do. The two agencies have different forces, different pressures, different advantages and disadvantages in their management of the spectrum. And I think a major way to think about how to improve it is to look at those advantages and disadvantages and trade them to the mutual benefit.

For example, the federal coordinators, because of the secrecy of much of their use of frequencies, and because of the basic way they operate, operate in private. And the Federal Communications Commission operates clearly in public. Everything they do is with people looking over their shoulder.

The operation in private gives the IRAC and the people that work in IRAC from the various agencies the opportunity to be careless sometimes and not do a very good job. And it does not appear in the Federal Register. On the other hand—that is a comma, not the period—on the other hand, they have an opportunity to plan ahead, to plan well in advance, perhaps more than the FCC does. If the FCC has some spectrum, the good Dr. Stanley and his commissioners cannot hide it. It is hanging out there for all to see, and somebody is going to be after it. And it is very difficult for them to say no, I will not give it to you. Your idea is a good one, but I cannot give it to you.

On the other hand, in the federal mechanism, the IRAC can say, here is a big band of frequencies, this agency wants some, that agency wants some, that agency wants some. In fact, each of you want all of it, and we are not going to give any of you any of it until you go away and devise a mechanism for sharing it among yourselves. And they do that. They try very hard to do that.

So, without trying to give a 30-minute lecture, yes, I think there are ways it can be improved, and very largely by learning from each other.

Senator INOUE. I must confess that there is nothing sacred about the 200 number. What do you think about the 200 number?

Dr. POWERS. I agree with you. There is' nothing sacred about the 200 number.

Senator INOUE. Is that a good number?

Dr. POWERS. I think it is a fair number. I would second Tom Stanley's comments, that it is very important to have a good target to shoot at. And there is no sense in having a little, minor target. There is no sense in saying take all the government spectrum away from it, or half of it, or some numbers like that. But I think it is perfectly good to have on paper, for real, voted by the Congress and signed by the President, a number about that size.

I was thinking, as some of the other witnesses commented about how large it was, that it may very well be that when you get right down to it, it is not possible or not feasible. Anything is possible. But it is not economically feasible to provide 200 megahertz in the end. But if it is not, the Congress can reconsider that target at that time.

Frankly, from an analytical point of view, I do not think you just say 200 megahertz or 175 megahertz, or some other number like that. What you would hope for from the Secretary of Commerce, I think, and his advisory committee, is a sliding scale saying this much spectrum, 10 megahertz, say, or 50, is cheap and easy to move from the federal sector to the non-federal sector.

The next chunk is going to cost considerably more. And it may have less value to the private sector. The next chunk will cost considerably more than that, and perhaps it has less value to the private sector. And you reach a conclusion on that basis, rather than in the end, saying an absolute 200 megahertz. But IEEE supports the idea of the 200 megahertz as a good target for today.

Senator INOUE. Thank you very much, Dr. Powers.

Senator Burns.

Senator BURNS. Just a couple of questions. General Cassity, I would ask you the same question. Is 200 too much?

General CASSITY. We think that, as Ms. Obuchowski has already testified, that 200 is a reasonable goal. It is the requirement to give up specifically 200, and that to be laid upon the Federal Government that we have a problem with. Now if there is an opportunity to negotiate or to point out the difficulty with giving up a particular frequency or a band of frequencies then we are satisfied to work with the FCC and with the Congress.

Our problem, of course, is to say you will absolutely give up 200 megahertz, now pick them and give them up. Or to have someone else pick those for us.

Senator BURNS. Would it be naive of me to say that if we ever got into a situation of a national emergency that the Government could recall that spectrum to be used for that purpose?

General CASSITY. I think it would be difficult, sir, the reason being that the equipment is designed only for specific frequencies. The size of the antennas, the filters used, the wave guides, and other things that have to do with the use of the frequency has been designed into the equipment. We could not test, maintain, or train with that equipment prior to an emergency if it is set up for spectrum not authorized for us.

So, in changing frequencies with things like air traffic control radars, uplinks and downlinks for satellites, and the satellites themselves in orbit, it is very difficult to suddenly go back to a frequency or to move from one frequency to another. The expensive part is rebuilding the equipment over the frequencies that you are going to use.

Senator BURNS. You just lost me.

General CASSITY. Let me try again, sir.

Senator BURNS. I understand. I cannot go into the technical part of it.

General CASSITY. Everyone chuckles when you mentioned the garage door openers a little while ago. And we have opened some garage doors as well out in San Francisco a few years ago with some integrated landing systems on airplanes, both commercial and military in the fog. And whenever we were using those systems we opened people's doors. It took a while to figure out what was causing it, but it was a little frequency interference problem. That really happens.

Senator BURNS. See there folks, it happens.

Thank you very much. That is all I have here.

Thank you, Mr. Chairman.

Senator INOUE. Our next panel consists of the special assistant to the Chairman of LiTel Telecommunications of Ohio, Mr. Paul Kindley; Vice President for Informations Services of the Tennessee

Valley Authority, Mr. Louis S. Grande; and the President of National Public Radio, Mr. Douglas J. Bennett.

Senator Burns has just asked to be a cosponsor of this measure. It is so ordered.

Mr. Kindley.

**STATEMENT OF PAUL KINDLEY, SPECIAL ASSISTANT TO THE
CHAIRMAN, LITEL COMMUNICATIONS**

Mr. KINDLEY. Thank you, Mr. Chairman.

In the interest of time, I also am going to summarize my remarks and ask that my formal statement be included in the record as if it was read in full.

Senator INOUE. All of your full statements are made part of the record.

Mr. KINDLEY. Thank you, sir.

My name is Paul Kindley and I am Senior Vice President responsible for the PCN Development and research effort for LiTel Telecommunications Corp. Our firm is representative of the small entrepreneurial-driven firms who have seized emerging technologies to provide not only jobs corporate success, but also enhancements beneficial for the public good.

From a historical perspective, the decade of the 1980's, particularly as it relates to the Telco environment may be viewed as the decade of fiber. Looking ahead to the decade of the 1990's, and with regard to personal communications, we feel that this decade will be regarded as the decade of wireless personal communications. The crux of my message to the committee today is that the U.S. technological leadership position in this arena of wireless personal communications is at significant risk.

In point of fact, if we were forced to pick a winner today in the first stage of deployment of wireless technology, we would have to pick the United Kingdom. Whether it is PCN, DECT, CT-2, CT-3 or other enhanced personal services, the European Community has a significant head start.

I would like to now call your attention to the visual attached to copies of my statement. This visual presents a metaphor of a step-stool describing our current position. To function properly, a step-stool requires at minimum three legs. For our personal wireless communications systems step-stool, these three legs consist of, number one, technology; number two, entrepreneurial drive; and number three, spectrum allocation.

The technology leg in this case is the development of a PCN network and supporting hardware. The entrepreneurial leg of our step-stool is represented by companies such as LiTel who are willing to implement and be the driving vehicle in this emerging technology. Entrepreneurial drive is certainly not exclusive to small company environments. However, as you will see in your visual, in a large company environment, this third leg of the step-stool is typically research and development for the sake of research and development, or in response to competitive pressures.

The critical third leg of the stool and the purpose behind this committee meeting today, is the provision of spectrum frequency. We must have a committed understanding as to what frequencies will be made available and in what time frame. Bluntly stated, spectrum delayed is spectrum denied.

From an entrepreneurial development perspective, we would be forced to curtail our development efforts due to our inability to attract sufficient capital resources in an uncertain environment.

Perhaps one could make the argument that the large firms would continue this development effort due to their deeper pockets for research and development.

However, referring again to our visual and looking at the right-hand figure, you will see that the path to actual implementation of advanced technologies in the marketplace is blocked in the large company environment by a desire to protect the status quo.

The result is clear. We will be left behind in this area of emerging technology without spectrum allocation.

Turning to the legislation before us, my colleagues and I would like to take this opportunity to congratulate the committee for focusing its attention on the House bill. While we applaud your efforts, we remain concerned with the short-term needs relative to developmental and experimental application and licensing.

Under a best-case scenario, the earliest the spectrum would be made available and reallocated under the current bill would be in a window of approximately 3 to 5 years. It is with this reality in mind and with due concern for the urgency of experimental testing and development that we propose that the Senate subcommittee consider the following modification and/or additions to the existing bill.

We propose that the experimental licensing authorization be expanded to what we would term a developmental licensing authorization. Essentially, the developmental authorization provides that persons pioneering new technologies would be rewarded by receiving a primary or co-primary license to offer the service in a given service area for a fixed period of time.

In summary, Mr. Chairman, the proposal to free up unused and/or underutilized government reserve spectrum is an excellent one. This bill sets up a prudent procedure for determining what frequencies can be made available and a prudent process for allocation.

Unfortunately, emerging technologies, such as wireless personal communications, cannot and will not wait for this process. Therefore, we propose an additional and alternate track which would facilitate the FCC making spectrum available to emerging technologies much sooner through an upgrading of the experimental licensing process.

I hold before me here a prototype of the end-user vehicle of wireless personal communications technology. LiTel, not unlike other entrepreneurial-driven firms, would welcome the opportunity to invest in experimentation and development to make this technology a reality in the United States. However, this investment and the willingness to face competition must be balanced with the short-term needs to achieve continued funding in our marketplace, as

well as the longer-term commitments to participate in the rewards of our development.

This is truly a win-win scenario. We have discussed the potential win as it relates to the developmental license and authorization process. However, the more significant win is for each of us in this room and out in our marketplace, as we look forward to that day in personal communications when we will be able to utilize a fully integrated, fully featured, fully mobile, intelligent, two-way communications tool, allowing us to both place and receive personal communications, anytime, anywhere within the United States.

Thank you, Mr. Chairman.

[The statement follows:]

STATEMENT

BY

PAUL KINDLEY

EMERGING TELECOMMUNICATIONS TECHNOLOGY ACT

AUGUST 2, 1990

Mr. Chairman, thank you for providing me with an opportunity to testify before your Subcommittee regarding Emerging Telecommunications Technologies. My name is Paul Kindley. I am Senior Vice President responsible for PCN development for LiTel Telecommunications Corporation. LiTel is a privately-held inter-exchange carrier founded in 1983 and based in Worthington, Ohio. Our firm operates a digital fiber optic telecommunications network in a seven state area in the Midwest. We employ approximately 900 individuals and serve over 91,000 customers. We are representative of the small entrepreneurially driven firms who have seized emerging technology to provide not only jobs and corporate success, but also enhancements beneficial for the public good.

From a historical telecommunications industry perspective, the decade of the 1980's may be viewed as the Decade of Fiber. Our belief in the superior performance and benefit of fiber lead us to be the prototype for small company financing and construction of a fiber optic network. This advanced system which is today in place throughout our service region is testimony to LiTel's technical and entrepreneurial leadership capabilities.

Looking ahead to the decade of the 1990's, we believe that we are at the beginning of the Decade of Wireless Personal Communications. LiTel is uniquely positioned to play a leading role in the development of this emerging technology. Unlike many license contenders, we have a subscriber base who could directly benefit from such services. In addition, we have an advanced fiber network to provide enhancements to wireless service and delivery. And lastly, we have a realistic program for staged testing and deployment of these technologies.

The crux of my message to the Committee today is that U.S. technological leadership in the arena of wireless personal communications is at great risk! In point of fact, if we were forced to pick a winner for the first stage in the race to deploy wireless technology, we would have to pick the United Kingdom. Whether it is PCN, DECT, CT-2, CT-3 or other enhancements to personal communications services, members of the European Community have a significant head start.

I would like to call your attention to the visual attached to copies of my statement. This visual presents the metaphor of a step stool to describe our current position. To function properly, a step stool requires, at minimum, three legs. For our personal wireless communications system step stool, these three legs consist of technology, entrepreneurial drive, and spectrum.

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The technology leg in this case is the development of a PCN network and hardware. Ultimate development of the proposed LiTel PCN system would utilize spread spectrum, code division, multiple access technology. The resulting service would produce more efficient uses and applications of scarce spectrum frequency. For those of you unfamiliar, conceptually, with PCN, allow me to paint you a verbal portrait. Successful implementation of this technology will provide the subscriber with a fully integrated, fully mobile, two-way communications tool where one phone and one or more phone numbers travel with the user anytime, anywhere within the United States.

The entrepreneurial leg of our step stool is companies such as LiTel, which are willing to be the implementation vehicle driving emerging technology. Entrepreneurial drive is not necessarily exclusive to small companies as you will see in your visual. However, in larger companies, this third leg is more typically research and development for the sake of research and development, or response to competitive pressures. There are numerous examples throughout the industry to illustrate this point, such as the pressure Apple Computer placed on IBM Corporation regarding development of enhanced personal computer systems. However, the example much closer to my heart is that of LiTel taking a leadership position in bringing fiber optic long-distance communications to our marketplace.

The critical third leg of the stool and the purpose behind this Committee meeting is the provision of spectrum frequency. Absence of available spectrum will cripple the developmental efforts regarding this technology in our country. We must have a committed understanding as to what frequencies will be made available and in what timeframe. Bluntly stated, spectrum delayed is spectrum denied! Small entrepreneurial development firms will be forced to curtail developmental efforts due to the inability to attract capital in an uncertain environment.

Perhaps one could argue that the large firm will continue the developmental effort due to their deeper pockets for R&D. However, referring again to our visual, you will see that the path to actual implementation in the marketplace is blocked in the large company environment by the desire to protect the status quo. More simply stated, financial consideration and protection of existing physical plant will severely retard, if not eliminate, the implementation of these new technologies in larger firms. The result is clear, we will be left behind in this area of emerging technology, and the consumer will be denied the benefits inherent in the timely successful development and implementation of wireless personal communications.

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Turning to the legislation itself, I want to congratulate the Committee for focusing its attention on the House bill. In general, we support the bill. While it is not likely to result in spectrum being made available for emerging telecommunication technologies in the short term, it will prove extremely valuable to those who hope to develop the next generation and beyond in these technologies. While I applaud your efforts I remain concerned with the short term needs relative to developmental and experimental licensing. Under a best case scenario, the earliest that spectrum would be available and reallocated under the current bill would be in a window of approximately 3-5 years.

It is with this reality in mind and with due concern for the urgency for experimental testing and development that I propose the following modification and addition to the existing bill.

We must provide risk takers and entrepreneurs with incentives to continue research and development efforts. Those willing to invest time, resources and capital in the experimental stage must have greater assurance regarding the ability to receive a return on their investment subsequent to successful experimentation and development. I am proposing that the experimental license authorization be expanded to what I would term as a developmental license authorization. Essentially the developmental authorization provides that persons pioneering new use would be rewarded by receiving license to offer the service in a given service area for a limited time period. I see no reason why this issue should not be addressed in this legislation. If I may suggest, the staff could use the Commission's experimental license process as a starting point and proceed from there.

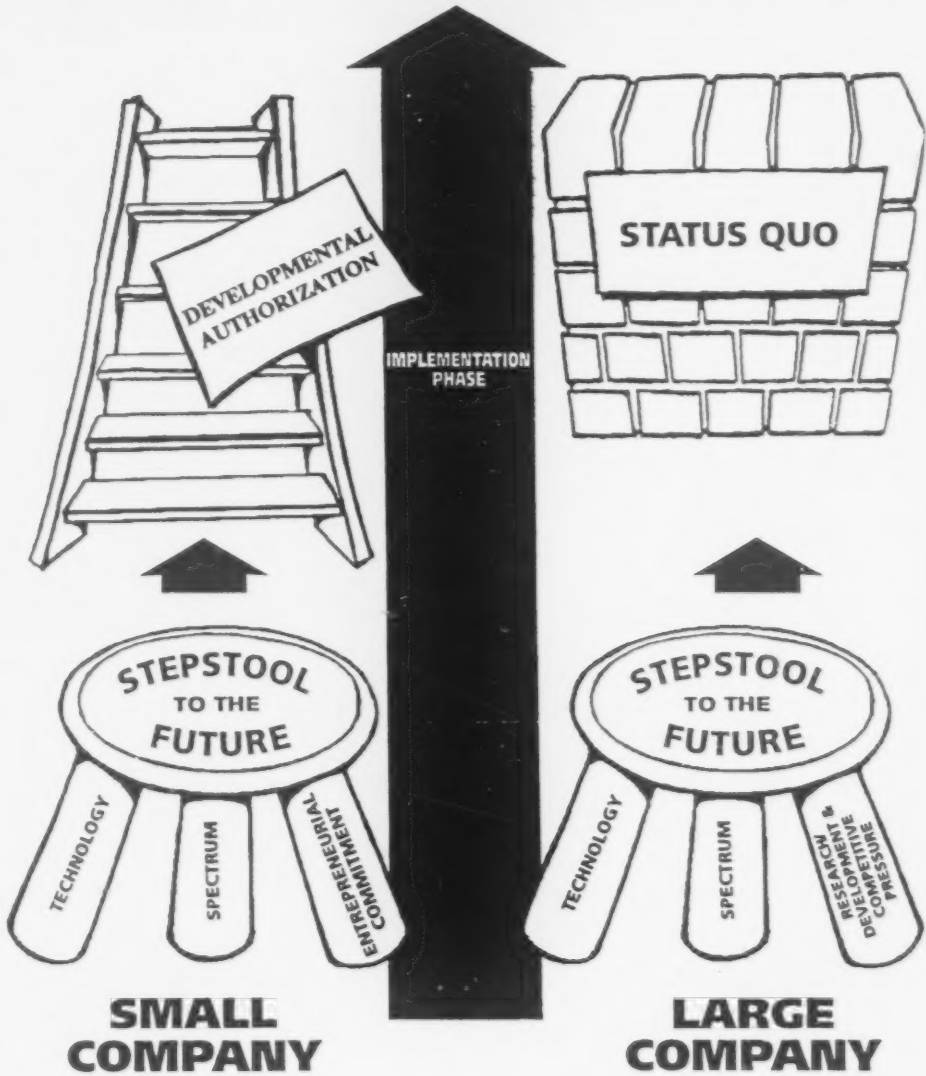
In conclusion, Mr. Chairman, maintaining technological leadership in this arena requires bold, imaginative and decisive action. The current bill is a good start, however, additional provisions and a stronger sense of urgency need to prevail. Firms such as LiTel are poised with entrepreneurial commitment and technology, however, the third leg of the step stool to successful implementation rests in favorable action, not only in this Committee, but within the FCC. The proposal to free up unused and under-utilized government reserved spectrum is a good one. This bill sets up a prudent procedure for determining what frequencies can be made available and a prudent process for allocation. Unfortunately, the technology for wireless personal communications will not wait for this process. Therefore, I propose the additional and alternate track which would facilitate the FCC making spectrum available to emerging technologies much sooner through an upgrading of the experimental licensing process.

I hold the end user vehicle for wireless personal communications in my hand. LiTel, not unlike numerous other entrepreneurial-driven firms would welcome the opportunity to invest in experimentation and development to make this technology a reality. However, this investment and willingness to compete must be balanced with short-term needs to achieve continued funding as well as longer term commitments to participate in rewards.

This is a true win-win scenario. We have discussed the potential win as it relates to the developmental license and authorization, however, the potentially more significant win is for each of us in this room and in the market place as we look toward that day in our future when we will be able to utilize a fully integrated, fully featured, fully mobile, intelligent, two-way communications tool allowing us to place and receive personal communications anytime, anywhere within the United States.

Thank you, Mr. Chairman.

PERSONAL COMMUNICATIONS



Senator INOUE. Thank you very much, Mr. Kindley.
Mr. Grande.

**STATEMENT BY LOUIS S. GRANDE, VICE PRESIDENT FOR
INFORMATION SERVICES, TENNESSEE VALLEY AUTHORITY**

Mr. GRANDE. Thank you, Mr. Chairman.

On behalf of the Tennessee Valley Authority, I am honored to appear before you today. Sitting behind me is Mr. Dick Crawford, VP for Power Transmission and Customer Services, to assist me on technical issues.

I appreciate this opportunity to share our views on the Emerging Telecommunications Technologies Act of 1990. I have submitted written testimony for the record, and would like to summarize that testimony.

As Vice President for Information Services, my responsibilities at TVA include managing our voice and data telecommunications. Prior to joining TVA, I was Vice President of Systems Planning for Contel Corporation, a major telecommunications company headquartered in Atlanta, Georgia.

Several members of this subcommittee are very familiar with TVA. Specifically, Senator Gore and Senator Ford, and we would like to thank them for their support over the years. But for those of you who have not had an occasion to deal with TVA issues before, let me take this opportunity to acquaint you with TVA.

TVA is a federally-owned corporation created by Congress in 1933 for the purpose of managing and developing the Tennessee River Basin. Today, we are one of the Nation's largest producers of electric power and one of 75 the largest consumers of coal. More than 7 million customers in seven states depend on TVA to keep their lights on and their businesses running 24 hours a day, even when emergencies strike.

Managing our power facilities requires a sophisticated and reliable communications network. And that is why I am here today. Because TVA is concerned that the legislation being considered here today will jeopardize our microwave communications network that is critical to our operations, and our ability to continually control and restore public power in times of emergency would be seriously compromised.

Although TVA is a corporation operated by the Federal Government, our power program has been self-financing since 1959, and receives no congressional appropriations. We have a congressional mandate to supply electrical power to our customers at rates as low as are feasible. The legislation now being considered, Senate bill 2904, could raise our costs, not only because we might have to replace existing equipment, but because it could force us to use more expensive commercial facilities.

We conservatively predict that replacing our existing networks with new ones operating above 5 gigahertz would cost about \$25 million. That is \$25 million in unnecessary expense that we might have to pass on to our customers.

TVA also is concerned that this legislation does not guarantee that technically suitable frequencies will be assigned to replace those we stand to lose. Without such replacement frequencies,

TVA's power communications network would have to be abandoned, forcing us to rely on commercial telecommunications services. That option is simply unacceptable.

Because the real issue here are not cost or convenience. They are issues of reliability and public safety, not just for the 7 million customers we serve, but for millions more who live throughout the Eastern United States.

TVA's geographically location makes us an important component of the Nation's Eastern power grid. Any major disturbances that affect the TVA power system create ripples in neighboring utilities that could affect other utilities hundreds of miles away. The result could be a significant blackout.

Recent catastrophes have proved what people in the electric utility business have known for years. That in the aftermath of a disaster, public communications networks cannot be relied on if they have been damaged. The written testimony I am submitting today clearly illustrates this point.

But let me say here that history has shown that if public communications networks survive a disaster, they may be paralyzed by the sheer numbers of people trying to use them. That is why virtually all electric utilities, including TVA, have built and maintained their own private communications networks. They are the only way we can be sure we will have the communications we need for constant system control during a crisis.

And that is why TVA is so concerned about this legislation. Because, by requiring the transfer of an arbitrary amount of spectrum to the private sector, it threatens the communications network we rely on every day. Extensive experience throughout the electric power industry has proven that the microwave communications network we use is the best available. And when we are talking about the welfare of TVA's 7 million customers, we believe that only the best is good enough.

We have no quarrel with the intent of this legislation. However, we believe TVA customers have an overriding interest in having its energy needs protected by TVA's existing microwave communications network. My comments here today are directed solely to the potential risks and costs that this legislation poses to power system operations.

Thank you for providing me this opportunity to testify on behalf of the Tennessee Valley Authority. I will be pleased to answer any questions you may have.

[The statement follows:]

WRITTEN TESTIMONY OF LOUIS S. GRANDE
VICE PRESIDENT, INFORMATION SERVICES
TENNESSEE VALLEY AUTHORITY
BEFORE THE U.S. SENATE COMMITTEE ON
COMMERCE, SCIENCE AND TRANSPORTATION
SUBCOMMITTEE ON COMMUNICATIONS
AUGUST 2, 1990 WASHINGTON, D.C.

Thank you, Mr. Chairman. On behalf of the Tennessee Valley Authority, I'm honored to appear before you today, and I appreciate this opportunity to share our views on "The Emerging Telecommunications Technologies Act of 1990."

As Vice President for Information Services, my responsibilities at TVA include managing TVA's voice and data telecommunications. Prior to joining TVA, I was Vice President of Systems Planning for Contel Corporation, a major telecommunications company headquartered in Atlanta.

Several members of this subcommittee are very familiar with TVA, specifically, Senator Gore and Senator Ford, and we greatly appreciate their support over the years. But for those of you who haven't had an occasion to deal with TVA issues before, let me take a moment to acquaint you with TVA.

TVA is a federally-owned corporation created by Congress in 1933 for the purpose of managing and developing the Tennessee River basin. It's our responsibility to provide flood control, aid navigation, produce electric power, and assist in the economic development of the Tennessee Valley.

Despite the diversity of TVA's activities, many people think of us primarily as an electric utility company, and with good reason, because we are one of the nation's largest producers of electric power and one of the largest consumers of coal.

Today, more than seven million customers in seven states depend on TVA to keep their lights on. Our service area includes all of Tennessee, and parts of Kentucky, North Carolina, Georgia, Alabama, Mississippi, and Virginia.

The TVA power system receives no Congressional appropriations and has been self-financing since 1959.

Meeting our customers' needs has never been easy, because not only do we have to generate power, we have to get that power to our customers through our 160 publicly-owned distributors. That requires coordinating the operations of our 44 power plants, 470 substations, and 17,000 miles of high-voltage transmission lines spread over nearly 80,000 square miles.

Adding to the complexity of our power system are the 44 interconnection points we maintain with other utilities that are part of the eastern power grid.

Managing our power facilities requires a sophisticated and reliable communications network, and that's why I'm here today. Because we're seriously concerned that the proposal being considered

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here today will jeopardize the microwave telecommunications network we use to operate the TVA power system. Without this microwave network, TVA's ability to carry out its day-to-day operations would be impaired.

The legislation before you today, Senate bill 2904, could force TVA to extensively modify our microwave network without a guarantee that technically suitable frequencies would be assigned to replace those we stand to lose through reallocation. Without such replacement frequencies, most of TVA's power communications network would have to be abandoned. We could be forced to rely on commercial telecommunications services, and our ability to operate reliably and to restore electric power in times of emergency would be seriously compromised.

The issues here are reliability and public safety, and not just for the seven million customers we serve, but for millions more who live throughout the eastern United States.

TVA's geographical location makes us an important component of the Nation's eastern power grid. Any major disturbances that affect the TVA power system create ripples in neighboring utilities that could affect utilities hundreds of miles away.

The result could be a significant blackout.

That's why it's well accepted in the electric utility business, that having direct control over our telecommunication networks is crucial to system reliability. These networks are completely independent from the commercial telecommunications networks, and with good reason, because they're the only way utilities can be sure they'll have the communications they need during a crisis.

TVA's own microwave network is a key factor in our ability to reliably supply power to our customers, twenty-four hours a day. That's why TVA is so concerned about this legislation, because it threatens our ability to effectively serve our customers.

Recent catastrophes have proved what people in the utility business have known for years: In the aftermath of a disaster, public communications networks can't be relied on if they've been damaged. If those public networks survive the disaster, they often are rendered useless by the sheer numbers of people trying to use them.

That's why virtually all utilities, including TVA, have built and maintained their own private communications networks.

Let me give you some examples that demonstrate the importance of utility-owned communications networks.

Last November, a series of tornadoes raced across northern Alabama. Eighteen people were killed, and 30,000 were left without power. The tornadoes destroyed more than 60 TVA transmission towers, and downed 360 miles of high-voltage transmission lines.

Using TVA's telecommunications network, our protection and control systems were able to electrically isolate the damage and temporarily reroute service until repair crews could arrive. Over the course of the next few days, TVA employees put in 30,000 hours to make physical repairs.

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Coordinating a disaster recovery effort like that would have been impossible had TVA been forced to rely on commercial communications networks. In fact, in the hours immediately following the disaster, we couldn't make public network telephone calls into or out of Huntsville, Alabama, one of the cities hardest hit by the tornadoes.

But our workers were able to do their jobs, and do them quickly, because TVA's own communications network continued to function.

A similar scenario was played out a month earlier in San Francisco, where public communication networks were jammed following the massive earthquake. But because the major utilities had their own communications networks, they were able to monitor distant substations, control vital equipment, and dispatch repair crews quickly.

In the aftermath of the San Francisco earthquake and Hurricane Hugo, the North American Electric Reliability Council issued a report which said, "Natural disasters stress commercial telecommunications networks to their limits."

"In 1989, the earthquake in California, and Hurricane Hugo demonstrated repeatedly the value of an electric utility being in a position to manage its own telecommunications network."

Five years earlier, in hearings before the Federal Communications Commission, the Utilities Telecommunications Council reached the same conclusion. The Council testified that the unique safety, security, and reliability requirements of energy utilities simply cannot be met by conventional telephone service.

That's why virtually all utilities have invested millions of dollars in building and maintaining their own private communications networks. That's why TVA is so concerned about this legislation, because, by requiring the transfer of an arbitrary amount of spectrum to the private sector, it threatens the very communications networks we rely on every day.

In TVA's case, our private communications network is used for many functions essential to the safe and efficient operation of our facilities. We use it primarily to control our power system, and to coordinate our efforts to restore power when disaster strikes.

We also use our telecommunications network to remotely monitor our nuclear power plants to ensure safe emergency shutdowns, and we rely on the network to coordinate emergency evacuations. In addition, our network allows us to control the water levels in our reservoirs, and helps us warn the public of floods due to structural failures.

Extensive experience throughout the electric power industry has proved that the microwave network we use is the best available. And when we're talking about the welfare of TVA's seven million customers, we believe that only the best is good enough.

That's why we must have a communications network that we control, that we maintain, and that we know is reliable.

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I think the evidence is clear that TVA's existing microwave communications network is essential for safe and reliable operation of our power system.

At the same time, private sector utilities would not be affected by this legislation. They would continue operating their own communications networks as we now do. This would put TVA at a competitive disadvantage in terms of ensuring the reliability of our power system.

But there's another reason we're concerned about this legislation, and that's reimbursement for our customers. Although TVA is a corporation operated by the Federal government, our Power program is self-financing and receives no Congressional appropriations. All the costs of our Power operations are paid for by our customers, so anything that costs the TVA Power system money, costs our customers money.

That's why TVA has reorganized and streamlined its operations to make them more cost-efficient and competitive. It's required some strong medicine, like cutting our overhead, and reducing our workforce by a third. But because of these initiatives and others, TVA has been able to serve our customers for two years without a rate increase, and we expect to achieve a third consecutive year of rate stability.

TVA has a Congressional mandate to supply electrical power to our customers at rates as low as are feasible, and the rates we charge our customers depend on our ability to hold down our costs.

The legislation now being considered could raise our costs, not only because we might have to replace existing equipment, but because it could force us to use much more expensive and less reliable commercial facilities.

We conservatively predict that replacing our existing network with a new one operating above 5 gigahertz would cost about \$25 million.

That's \$25 million in unnecessary expense that we would have to pass along to our customers.

We have no quarrel with the intent of this legislation, that of creating new economic opportunities for communications entrepreneurs. But we believe TVA customers have an overriding interest in having their electric energy needs protected by the continued availability of a reliable, utility-owned communications network.

My comments here today are directed solely to the potential risks and costs that this legislation poses to TVA's power system operations.

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Senator INOUE. Thank you very much, Mr. Grande.
Now, Mr. Bennet.

**STATEMENT BY DOUGLAS J. BENNET, PRESIDENT, NATIONAL
PUBLIC RADIO**

Mr. BENNET. Mr. Chairman, thank you very much for the opportunity to appear.

The current lack of available spectrum under FCC jurisdiction limits U.S. industry's ability to develop and deploy new communications technologies. It is ironic that we are running out of usable spectrum just as we are immersed in the information age. The United States cannot be left out of the global race to develop new telecommunications products and services.

S. 2904 takes a very important step toward alleviating this problem and can help American industries retain their competitiveness in the critical telecommunications area.

The advances in telecommunications technologies we have heard described today are creating exciting new services for the American consumer and opportunities for American business.

My first point is that the very same technologies offer important opportunities for public service, the kind provided by public radio. Next, the most important advance in the broadcast industry, which will likely require additional spectrum for its introduction, is digital audio broadcasting.

Digital audio broadcasting is a system of transmitting audio signals without noise or distortion that produces virtually the same sound quality as compact discs, dramatically superior to FM sound quality. With American consumers becoming more sophisticated and discriminating in the type and quality of audiovisual services they demand American equipment manufacturers, the radio and television industry, and other service providers must meet this new standard of excellence. Our international competitors surely will.

The introduction of digital audio broadcasting will require new spectrum because both digital and existing radio services will have to be available during a transition period. To attempt to offer digital signals by shutting off existing stations would disenfranchise large numbers of the listening public. Since new receivers will have to be made available for digital radio, it will take time for consumers to migrate to the new digital band. This is precisely the same sort of simulcast scenario that the FCC has already endorsed for the introduction of advanced television services.

Digital signals offer a wider dynamic range and cleaner sound than can be offered by FM or AM broadcast under the best reception conditions. FM's analog signals simply do not sound as good to the human ear as a digitally produced signal. And we add to that the fact that the American listener is mobile, moving through urban canyons and in and out of buildings.

Imagine yourself driving along M Street with your tuner on your favorite FM public radio station and hear it fading in and out. What happens is that the listener is deprived by interference of programming and the radio station is deprived quickly of the listener, who shifts to another station. You can hear this. Sometimes if your car is stopped, it is just a matter of feet until you move

back into a zone in which you can hear the FM signal. Digital Audio Broadcasting is not subject to that kind of interference and is truly a quantum improvement in radio technology.

My next point is that the Europeans have developed a revolutionary system called the Eureka Digital Audio Broadcast for transmitting CD-quality, error-free broadcasts via satellite and land transmitters direct to the public. Systems comparable to Eureka are under development by American companies, but the Canadians and Europeans are farther along in this process.

There are currently several applications pending at the FCC seeking introduction of this new kind of radio service based on competing digital systems. Further developments will certainly follow in the months to come. The Commission is to be commended for responding quickly to these developments with yesterday's announcement of a forthcoming notice of inquiry on digital audio broadcasting's applicability in the American marketplace.

In making spectrum decisions, the needs of existing radio broadcast services, both commercial and noncommercial, should be given a priority. Existing services must be allowed to remain competitive with emerging digital audio technologies and to enhance the quality and diversity of their services. Spectrum must be set aside by the FCC for public radio in any new allocation scheme. Public radio has long needed additional local outlets in order to provide cost-effective public radio programming services to diverse but widespread pockets of unserved and underserved Americans.

Mr. Chairman, the public's airways are indispensable highways, as has been said frequently over the years, of the information age. In countries with less crowded airways, companies are poised to develop and bring to the marketplace advanced radio services and products. Unless action is taken soon by Congress and the Federal agencies, it will be their economies and their citizens that benefit first from better communications. As we move ahead, Congress and the FCC must also protect and encourage the development of the public radio and the public radio industry which directly serves the American public.

Thank you very much and I would be happy to try to answer questions.

[The statement follows:]

STATEMENT OF DOUGLAS BENNET, PRESIDENT, NATIONAL PUBLIC RADIO

Mr. Chairman and members of the subcommittee, it is a pleasure to be here today on behalf of National Public Radio and its almost 400 member stations.

The current lack of available spectrum under FCC jurisdiction limits U.S. industry's ability to develop and deploy new communications technologies. It is ironic that we are running out of usable RF spectrum just as we are entering the Information Age. The United States cannot be left out of the global race to develop new telecommunications products and services. The Emerging Telecommunications Technologies Act of 1990, S. 2904, takes a step toward alleviating this problem and can help American industries retain their competitiveness in the critical telecommunications arena.

Advances in telecommunications technologies are creating new services for the American consumer and new opportunities for American business. The very same technologies offer important opportunities for public service, the kind provided by public radio.

The most important advance in the broadcast industry which will likely require additional spectrum for its introduction is Digital Audio Broadcasting (DAB). DAB is a system of transmitting audio signals without noise or distortion that produces virtually the same sound quality as compact discs -- dramatically superior to FM sound quality. With American consumers becoming more sophisticated and discriminating in the type and quality of audio/visual services they demand, American equipment manufacturers, the radio and television industry, and other service providers must meet this new standard of excellence. Our international competitors surely will.

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Radio Airwaves Are A Public Resource

The severe shortage of spectrum that limits commercial development of new technologies also limits the ability of the public radio community to offer specialized programming and services to the increasingly diverse American public. Congress and the American people have always believed that the airwaves are a public resource that must be used for the public benefit. So while it is crucial to provide a regulatory environment that encourages the expansion of existing telecommunications systems and allows the development of new and innovative technologies, Congress and the FCC must also protect and encourage expansion of the noncommercial radio broadcast industry, which directly serves the public.

Radio competes for the attention of audiences with numerous other forms of communication including network and cable television, stereo, compact disc players and video cassette recorders. Radio must remain versatile and feature high quality sound in order to maintain its audience. Just as more advanced television technologies, such as high definition television, will improve television picture and sound, digital encoding techniques for radio will enhance audio programming and other high quality sound that consumers desire. A digitally encoded radio signal is essentially impervious to degradation and can be received over a wide range of reception conditions, from crowded urban areas to sparsely populated rural communities. With the introduction of Digital Audio Tapes (DATs) in this country, radio may become stranded as the last analog audio format unless broadcasters and policy makers are prepared to tackle head-on the challenges and opportunities that DAB presents.

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Digital audio broadcasting would enable public radio to offer a wider range of program services, and to tailor them more appropriately to local, regional and national audiences. With DAB technology, the possibility exists for both local and national networks providing enhanced public service. These specialized offerings could increase public radio's efforts to address illiteracy, increase citizen participation in the electoral process, build community partnerships through public radio outreach programs, provide expanded public affairs and educational programming, and offer language training. Many more Americans, including the elderly, ethnic minorities, children, and the handicapped, can be better served if we can increase the number and diversity of stations qualified for financial support from the Corporation for Public Broadcasting (CPB).

Opportunities Offered by Digital Audio Broadcasting

Mr. Chairman, the design of digital audio broadcasting is in its early stages and no one can predict with any certainty exactly when and in what form DAB will enter the marketplace. It is clear that digital radio has two principal advantages over existing FM technology: higher quality sound and greater spectrum efficiency. The cost of DAB transmission will probably be lower than FM because less power is required, and, under some proposals, many broadcasters would share the same transmitting facilities. Existing AM/FM receivers could not receive DAB broadcasts, so American industry would have to design, manufacture, and sell both domestically and internationally a new generation of receivers.

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The Europeans have developed a revolutionary system (called the Eureka DAB) for transmitting CD-quality, error-free broadcasts direct to the public. Canada's commercial and public broadcasters have rallied around the Eureka system and are this summer demonstrating it throughout the Canadian provinces. Canada appears united and fully committed to an early upgrade from current analog broadcasting as soon as spectrum is identified for the new digital radio service.

The Canadians and Europeans have joined with many other nations in pinning their hopes for a global allocation for the proposed digital radio service at the World Administrative Radio Conference (WARC) in 1992. Systems comparable to Eureka are under development by American companies, but the Canadians and Europeans are farther along in the process. There are currently several applications pending at the FCC seeking introduction of new radio services based on these competing digital radio systems, several targeted for domestic audiences and one designed for African and Middle Eastern countries. Further developments will certainly follow in the months to come. The Commission is to be commended for responding quickly to these developments with yesterday's announcement of a forthcoming Notice of Inquiry on digital audio broadcasting's applicability to the American marketplace.

These rapidly evolving DAB technologies, and our ever-increasing understanding of their potential uses for public purposes, require that U.S. policy remain flexible and keep open as many options as possible.

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Radio is a Uniquely Positioned Media Resource

Radio is an important and pervasive component of our communications industry. Radio requires no print literacy to be meaningful, no household electric system to be available, and no disproportionate concentration of resources for installation and operation.

Radio is a dominant media resource domestically. Radio reaches 96 percent of all Americans each week and is a major source of news in America. Public radio reaches more than 13 million people each week with its distinctive blend of news and cultural programming -- a 36 percent increase since 1985. There are an estimated 527 million radios in the United States, 342 million (65%) of them in homes and 185 million (35%) out of homes. Twenty-one million walk-along users listen to radio. Three out of four adults are reached weekly by radio while in their cars.

Radio is the most affordable and accessible medium for reception by citizens of developing countries and remote outposts of the industrialized world. Few are unable or unwilling to purchase a portable radio and the batteries that keep it running. The cost of constructing a radio broadcast system capable of reaching an entire nation is frequently the same as that of purchasing a single broadcast-quality videotape recorder and television studio camera. Radio is ubiquitous because it is so cost-effective.

In the small southern African Kingdom of Swaziland, for example, less than 20 percent of the people have electricity or telephones in their homes, but 80 percent own a radio. Every market center sells a variety of radio batteries used by the portables found in most every rondavel hut in the country.

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This fact graphically illustrates that the need for communications rivals the basic needs of food, clothing, and shelter. In Swaziland there are two broadcast services, one in the native language of SiSwati, and the other in the second national language, English, which is included largely as a supplement to the educational development of the nation.

Technology, Globalization, and the Future of Public Radio

One-sixth of the American public is still beyond the reach of any local public radio station. In the House and Senate reports that accompanied the Public Telecommunications Act of 1988, Congress placed a high priority on expanded public radio service to unserved and underserved segments of American society. The reports indicate that such service enhancements will be best achieved through the addition of new stations providing multiple program streams.

The Public Radio Expansion Task Force convened under the auspices of the Carnegie Corporation and CPB concluded that it is possible for public radio to increase its reach from 86 to 96 percent of the population by the year 2000. The Task Force states that this can be accomplished in part by increasing the number of CPB-qualified stations. The Task Force noted that there is a special urgency to this effort because the spectrum space needed for additional service is rapidly disappearing in many parts of the country.

The cultural and ethnic diversity of our nation as we approach the 21st century will require many more public radio outlets, particularly in urban centers, for the development of multiple program streams aimed at providing the diversity of cultural and informational services most needed by and meaningful to these constituencies.

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Yet in these major markets there are simply no additional frequencies available for the development of new signals within the noncommercial FM broadcast band. The presence of television Channel 6 outlets and the vagaries of spectrum usage based on contour-protection methodology unique to the noncommercial band preclude the establishment of new public stations on currently reserved FM spectrum.

The Need For Additional Spectrum To Achieve Complete Nationwide Public Radio Coverage

Public radio has been a participant in all of the Notices issued by both the Federal Communications Commission (FCC) and the National Telecommunications and Information Administration (NTIA) dealing with allocation of broadcast spectrum. Public radio representatives participate on committees studying U.S. requirements for WARC '92, the advance television planning committee, the Frequency Management Advisory Council, CCIR Working Groups, national and local Frequency Coordinating Committees, and the Advanced Radio Committee.

As early as 1987, NPR filed comments in the FCC's Notice of Inquiry on Advanced Television Systems urging the Commission to consider the need for digital audio broadcast services in its deliberations on spectrum allocation issues. In that filing NPR noted that the need for additional distribution channels is urgent and that the development of digital audio broadcast service is necessary for effective competition with new forms of aural media. Although the significance of NPR's message was not immediately recognized, recent developments in digital audio technology have proven NPR's forecast to be accurate.

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Public radio has a special mission to fulfill. At a time when commercial stations are eliminating news positions, slashing budgets and cutting the number of news programs, public radio stands out as a vital voice addressing the major social, cultural and educational issues of concern to Americans. Fueled by a flexibility that allows radio to respond quickly to a dynamic society, public radio can shed light on these and other issues important to our changing nation.

Spectrum must be set aside for public radio in any new allocation scheme. Channels will be needed to fulfill the congressionally-mandated objectives of domestic public radio broadcasters. Public radio has long needed additional local outlets in order to provide cost-effective public radio program services to diverse but widespread pockets of the American public. Any FCC allocation of spectrum currently under its jurisdiction or made available as a result of this legislation should provide a set-aside for public radio. NPR believes that a 20 percent set-aside exclusively for public radio will be necessary to ensure availability of the diverse programming envisioned by Congress. Additionally, all such public radio assignments should be "interleaved" (e.g. assigned on every fifth channel) to avoid the types of subtle inefficiencies that have restricted the usefulness of the currently reserved FM spectrum. Less than one-half of the current noncommercial FM allocation has been assigned to public radio stations. Existing spectrum allocations are not adequate to provide a nationwide public radio system. This set-aside would make up for this deficiency, allow public radio to expand its services to unserved and underserved audiences, and take advantage of technological advances as they occur.

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The Influence of Public Radio Reaches Beyond American Borders

We stand on the brink of a new age of information, a realization of the electronic global village. It is perhaps prophetic that in the same year the Public Broadcasting Act became law, Robert Sarnoff predicted that "Information will become a basic commodity equivalent to energy in the world economy...it will function as a form of currency in world trade, convertible into goods and services everywhere."

Public radio's influence is already felt far beyond U.S. borders. Since its inception, NPR's programs have been rebroadcast overseas via the Armed Forces Radio Television Service (AFRTS) and the Voice of America (VOA). The United States Information Agency (USIA) also utilizes public radio programming as an integral part of its international service aimed at foreign nationals worldwide.

NPR has been approached by several foreign broadcast entities interested in arranging for more complete retransmission of NPR news and information programs. A "global" transmission of NPR programs presents a special opportunity to share this national resource with people in other countries who want to learn about Americans and their culture from the unique perspective of public radio programming with material that carries with it the accents and diversity of America.

Ours is a world of many voices and of increasingly focused interdependent issues. America is special because it is the exemplar of both personal liberty and individual

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industry. Public radio envisions its future as offering its unique programs to listeners around the globe, informing and inspiring ever wider audiences. The value of public radio is not only its service to Americans but its ability to share the many voices of America with people worldwide.

Conclusion

Mr. Chairman, the public's airwaves are an indispensable highway of the Information Age. The Geneva-based International Telecommunications Union (ITU), which sets guidelines for spectrum use, reports that as many new frequency assignments were recorded in the past decade as in all the previous 80 years of radio communications. In new technological developments, the first to enter the market benefits financially and sets the standard for domestic and international markets. In countries with less crowded airwaves, companies are poised to develop and bring to the marketplace advanced radio services and products. It will be their economies and citizens that benefit first from better communications. The U.S. has to move ahead on more efficient uses of spectrum or risk falling behind.

The global future holds a special place in public radio's vision of providing service to an ever-evolving and expanding audience, both domestically and internationally. Public radio can respond to this country's increasing variety of ethnic and cultural heritages with programming that is creative, relevant and understandable. International audiences can also enjoy and be informed by offerings with an American perspective and content. Present spectrum and technological limitations can prevent the realization of this vision of public radio's future. Domestic telecommunications policies must enable public radio to continue to meet the challenge of providing diverse, quality programming in the century to come.

Senator INOUE. Thank you very much.

Mr. Kindley, PCN technology is similar to the cellular telephone system, is it not?

Mr. KINDLEY. Similar in certain aspects, and goes well beyond, sir. I will be glad to try and make a distinction, if you would like.

Senator INOUE. Why then do we need PCN, if this is the same thing?

Mr. KINDLEY. That is a good point. Let me make the simplest distinction.

Today, when we call someone, we call a place. That is still the state of the art, even with digital cellular' expectations in the future. With PCN we would no longer call a place, we would call a person. It is that full mobility of incoming and outgoing telephone traffic, over an intelligent network such that your telephone number now becomes your number, regardless of where you are located.

Senator INOUE. What would be the comparison in cost today?

Mr. KINDLEY. There are very favorable projections, and we would be glad to submit those for your information. With the appearance of the microcell technology under the PCN scheme overall the intelligent network seems to be more cost-effective long term than trying to make the cellular cells for cellular telephone traffic smaller and smaller and smaller. In fact it would never provide the same sort of functionality.

Senator INOUE. Is this a PCN telephone?

Mr. KINDLEY. That is actually the prototype of the European market, CT-2. That is the most advanced model at this moment, and very similar in size, shape, and design as to what we have in mind for the PCN network downstream.

Senator INOUE. This will have the same range as the cellular?

Mr. KINDLEY. The range, as far as the user is concerned, yes, sir. The network would be nationwide eventually. The range as far as the actual cell is of a much smaller, lower frequency, lower power type cell. To the end use, absolutely no difference in distinction in terms of accessibility and coverage.

Senator INOUE. Is this not now being developed under an experimental license in the United States?

Mr. KINDLEY. That is correct, sir. The application has been granted for an experimental license, and I believe the firm is Cellular 21 that has that particular grant. They are proceeding, but not with PCN's, sir, they are working on CT-2 technology.

Now, to make a distinction here, CT-2 is what we call telepoint. To use the analogy of the European market, what that really says is there are stations based throughout London, for example, and as long as you stand within approximately 100 feet of a station, you could use a phone such as that to place an outgoing telephone call. That is the technology that Cellular 21 has been licensed to test in the U.S., sir.

Senator INOUE. If that is the case, do you need more spectrum?

Mr. KINDLEY. We would absolutely have to have more spectrum for true PCN applications. CT-2 in the opinion of many industry experts, myself included, CT-2 is a step that brings very little added value in the U.S. marketplace.

Senator INOUE. Now, you spoke of developmental authorization, and I just spoke of experimental licensing. What would you say is the difference between the two?

Mr. KINDLEY. The difference, fundamentally, is the question of, as a small entrepreneurial firm, issues of driving emerging technologies. Under an experimental license, I have very little assurance that the investment I make in development will actually pay me a reward.

So, first of all with regard to venture funding, it is very difficult to achieve funding which allows me to take the sort of risk. But more importantly, downstream I have no assurance that the risk I took will bring the reward. So that is the tie-in that I am trying to make between the distinction of upgrading an experimental license to a truly developmental license, where I get some assurance that for a fixed period of time, I will get either a primary or a co-primary license in order to get a return on my investment.

Senator INOUE. Under your proposal, would you be excluding AT&T and the regional Bell operating companies?

Mr. KINDLEY. That is an excellent question, sir, and in my background I do have time with a regional Bell company. So I will speak from both perspectives.

The visual that I mentioned somewhat addresses that issue. A firm such as RBOC would certainly have an interest in the emerging technology of wireless personal communications. However, the interest in, and true need to implement are two different things.

I would see the advent of wireless personal communications as a threat to an RBOC because it is a threat to their physical plant. It is a threat to their financial revenue streams.

So there is certainly a need to be prepared to respond to competitive pressures, but there is no motivating force to implement.

AT&T, on the other hand, in today's paper has a particular announcement that seems relevant. AT&T seems to have a mystery technology, whereby they are going to be able to give us PCN without experimental development in a period of less than 1 year.

Senator INOUE. Thank you very much, Mr. Kindley.

Mr. KINDLEY. You are welcome, Mr. Chairman.

Senator INOUE. Mr. Grande, I believe your microwave system is about 5 gigahertz, is it not?

Mr. GRANDE. No, sir. It operates a 1.7 to 1.85 gigahertz. We do have some that are above.

Senator INOUE. You speak of an exemption. If the exemption is provided, does that mean that you would favor this measure?

Mr. GRANDE. Excuse me, sir?

Senator INOUE. If the TVA is exempted, you would favor this bill?

Mr. GRANDE. Yes, sir.

Senator INOUE. What if a provision is put in this bill to provide you with reimbursement, so that there will be no cost on your part to relocate?

Mr. GRANDE. That would be an acceptable alternative to the TVA. Our concern is the cost as it relates to the customers that we serve.

Senator INOUE. So if the private sector provides the reimbursement you would favor this measure?

Mr. GRANDE. That would be an acceptable alternative to us, yes, sir.

Senator INOUE. And we may very well consider that.

Mr. GRANDE. Thank you, sir.

Senator INOUE. Mr. Bennet, what new services would National Public Radio provide if you got more spectrum?

Mr. BENNET. I should say that we are up against the wall with the spectrum we now have, which is 20 percent of the FM band for both religious and noncommercial educational broadcasters. That spectrum is largely used in the country.

We have now a nationwide system which consists largely of NPR member stations and some other public radio stations. We are not able to develop services—because of lack of spectrum and lack of financing—for lots of other populations that could be served. We could be reaching, instead of 10 or 11 percent of the population regularly, 20, 30, or 40 percent.

I think the primary targets of opportunity are places in which the efficiency of radio would most be realized. I mean, populations that are not literate, for example, or perhaps populations with languages other than English.

And these technologies of far the possibility not only for reaching people, but for stimulating invention of services that we may not even be able to think of today. A lot of what we have heard today we would not have thought of 10 years ago.

I think that the point is if you address this as a question of how to utilize a public asset, spectrum for public purposes, there are lots of public purposes a public radio could be serving that are currently precluded by a scarcity of dedicated spectrum.

Senator INOUE. When do you expect digital radio to hit the market?

Mr. BENNET. I heard a tape of a demonstration done in Canada today. The capacity is there. Beyond identifying a new band, the question is how soon the receivers can be built and the transmission facilities can be put in place. We do not have a definite projection, but surely soon.

Senator INOUE. And you have maintained that digital radio is more spectrum efficient than analog radio. Is that correct?

Mr. BENNET. It is more efficient in three ways. One is that you can more closely control the range so that you can have a station in this city, and a station there, and a new third station in between providing a clear signal on the same channel. Secondly, the power requirements for the digital are less. And third, the digital signals, unlike analog signals, can work side-by-side, so that you can get more digital broadcasts into a unit of spectrum.

Senator INOUE. If that is the case and if the digital radio is the thing of the future, why would you need more spectrum?

Mr. BENNET. The primary reason for the additional requirement is the transition. In other words, there has to be a way for the present system to continue to broadcast while the digital system is brought on. You cannot just turn off what is there and turn on the new digital system because it will take a considerable period for people to acquire the transmission and receiving facilities.

Senator INOUE. Are you suggesting that when the transitional period is over you return it?

Mr. BENNET. It could be a long time, but our position is that the spectrum ought to be used for optimum purposes. And what that would look like after a 20-year transition period is very hard to project today. But surely, the discussion that we are having today about reallocation of a spectrum should continue.

Senator INOUE. Is the digital radio the type that I can be listening to and drive into a tunnel and still get the——

Mr. BENNET. Absolute satisfaction all the way through.

Senator INOUE. In a tunnel?

Mr. BENNET. That is what I understand. I am hearing a murmur of dissent. The Chairman knows that my technical knowledge in some areas is limited, but there was a remarkable demonstration in Geneva last fall that provided an excellent signal even through a long tunnel.

Senator INOUE. So it is better than the present FM?

Mr. BENNET. It is much better than the present FM.

Senator INOUE. Obviously, I am no technician here.

I want to thank all of you for sharing your wisdom with us. We hope to move on this expeditiously.

And so with that, we will stand in adjournment.

[Whereupon, at 4:25 p.m., the hearing adjourned.]

[The following information was subsequently received for the record:]

COMMENTS OF THE ASSOCIATION FOR
MAXIMUM SERVICE TELEVISION

Emerging Telecommunications Technology Act
(S. 2904)

These comments are submitted on behalf of the Association for Maximum Service Television (MSTV)* in the matter of the Emerging Telecommunications Technology Act (S. 2904) to the Subcommittee on Communications of the Senate Committee on Commerce, Science and Transportation. MSTV respectfully requests that its comments be included as a supplement to the record of hearings on S. 2904 held before the Subcommittee on August 2, 1990.

For over 30 years MSTV has represented the interests of local television stations in assuring that the American public receives free, local and universal television service of the highest technical quality, including HDTV.

MSTV supports S. 2904 as an effective means toward more efficient management of government spectrum and freeing up spectrum for the commercial development of new technologies, including HDTV.

The scarcity of the spectrum and the need to apportion and manage it efficiently to yield maximum benefits to the public were the fundamental premises for the Radio Act of 1927 and the Communications Act of 1934. For over half a century, the Federal Communications Commission's most basic responsibilities have been to allocate spectrum to particular uses, to allot it among specific users (in the case of broadcasting, to allot channels to specific communities and assign licenses) and to serve as an airwaves traffic controller preventing spectrum congestion and interference.

*Formerly the Association of Maximum Service Telecasters (MST).

While the escalating demands for commercial spectrum in recent years have pressured the FCC to relax its interference standards, there can be no doubt that its conscientious efforts have been indispensable to the development of this country's mushrooming communications sector. Moreover, the FCC's open and public processes, and the interplay of potential new users and uses and all manner of political and economic interests, constantly apply incentives for more intensive and efficient spectrum use.

These incentives are not present at NTIA, within the Department of Commerce, which administers spectrum used by government agencies. The NTIA's government spectrum management process, however conscientious, is largely divorced from marketplace pressures and public scrutiny. The information available, however, suggests a need for improvements in NTIA's spectrum management procedures and this bill, along with NTIA's own recent spectrum initiatives, will contribute to that end.

The future potential of terrestrial television to deliver high definition television is of abiding concern to MSTV. Sufficient spectrum is key to ensuring that the American public will have the opportunity to receive its local television service via this technology. It is essential to protecting the nation's \$40 billion stake in local television station participation in HDTV. And it will help inaugurate over \$100 billion of domestic investments in new television equipment.

MSTV first sought spectrum for local-broadcaster HDTV from the FCC in 1977 and testified to its future need before this subcommittee as early as 1981. More recently, MSTV's petition,

in February 1987, supported by 58 other broadcast organizations, led to the FCC's initiating its advanced television inquiry. MSTV also was instrumental in creating and raising broadcaster contributions for the Advanced Television Test Center.

Television stations today are devoting unprecedented resources and efforts to develop an HDTV system that is suitable to our present system of broadcasting. With the help of dramatic new advances in transmission technology, we are seeking to accomplish this feat within the VHF and UHF spectrum already reserved for local television use.

Nonetheless, in three respects this legislation's effort to free up government spectrum has vital implications for television broadcasters' future potential to deliver HDTV.

FIRST, additional spectrum of up to 100 MHz will be essential for the various feeder transmissions essential to make terrestrial HDTV possible -- the microwave links necessary to move HDTV programming from studios to transmitters, the HDTV links needed to bring news stories from field locations where they occur to the studios, and the HDTV links for a host of regional and other program exchanges. Because they are point-to-point, most of these uses do not require an exclusive allocation and can be shared with other spectrum uses. But they are critical to the effective full roll-out of terrestrial HDTV.

SECOND, freeing up underutilized government spectrum for other commercial users will help preserve the quantity and quality of broadcast spectrum necessary for HDTV.

During a period of vastly accelerating demands for video services and a corresponding doubling of the number of over-the-air stations, television spectrum has been under enormous and increasing pressure from other spectrum users. In the last 20 years alone, this has resulted in nearly 100 MHz of spectrum being taken away from broadcasters in major markets and given to other users, such as business and local government mobile radio.

At the same time, the FCC has permitted numerous new sources of interference to television service by "shoehorning" new users into and next to television channels. The FCC has justified increasing interference levels as necessary to permit the introduction of new telecommunications technologies and services or the expansion of existing services. The resulting gradual but relentless cumulative interference threatens television broadcasters with the dire technical and economic straits now occupied by AM radio. In fact, MSTV has dubbed this degradation of broadcast quality as the "AM-ization" of television and has petitioned the FCC to initiate a wide-ranging inquiry on television interference.

Reallocating government spectrum to meet these competing demands for commercial spectrum will help ensure both current and future television broadcast quality.

THIRD, while broadcasters are committed to making the enormous investments to transition to HDTV in the current television bands, that result is by no means assured. We are relying on unproven technologies. Until they are tested in hardware form, we simply don't know whether the vastly increased amount of information to be transmitted can be compressed into these channels or whether additional spectrum will be necessary.

In sum, freeing substantial spectrum from the government sector will serve the three purposes of providing needed non-exclusive spectrum for broadcast HDTV feeder services, of alleviating the pressures of other users for television spectrum needed for HDTV implementation, and of creating possible new bands for terrestrial HDTV.

A few points about specific provisions of the bill:

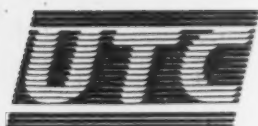
We believe that the bill is well-advised in establishing a firm deadline for NTIA's report to Congress, in establishing a fixed floor of 200 MHz to be freed up from government use, and in establishing a blue-ribbon panel to review NTIA's report after its submission to Congress. The need for moving quickly is urgent, especially since it will take up to 15 years to make the transition to new uses.

Moreover, while we have great respect for the quality of the spectrum analysts at NTIA and its current Administrator, the reality is that NTIA is a member of the Executive Branch. As such, it will have a difficult challenge exerting discipline over its comrade agencies and making tough spectrum allocation decisions that pit government against private uses. The 200 MHz minimum spectrum reallocation and blue-ribbon panel oversight are essential to implement this mandate. We also propose that consideration be given to having the NTIA's report reviewed by an independent panel (perhaps consisting of the NTIA Administrator, an FCC Commissioner and a representative of the General Accounting Office) before its submission to the Congress.

While we strongly endorse the priority S. 2904 places on reallocating government spectrum below 5 GHz, we believe there also is a need to survey government spectrum use above 5 GHz. We urge that, as a second phase of the spectrum study, NTIA be instructed to evaluate government use of spectrum above 5 GHz for potential reallocation to commercial use. While this spectrum is not an adequate substitute for that below 5 GHz, technological innovation will make it increasingly useful for future telecommunications technologies. By beginning the planning for its more efficient use now, the need of a retroactive review to reallocate spectrum already in use can be avoided in the future.

Finally, with respect to proposals that auctions be used to allocate or assign freed spectrum, MSTV agrees with the testimony of Dr. Thomas P. Stanley of the FCC that such auctions should not be used for broadcast spectrum. Auctions would be particularly inappropriate for determining how much additional spectrum is needed to bring HDTV to the American people through the local broadcast system or which licensees should get that spectrum. Those are inescapable public-interest determinations which must be grounded in the fundamental decision to ensure that the local broadcast system can compete in the video markets of the future and provide free and universal service to the American public.

Television stations and the public they serve have a very important stake in this seminal piece of legislation. MSTV urges in the strongest possible terms that, with a few modest modifications, it be promptly adopted.



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August 3, 1990

The Honorable Daniel K. Inouye
Chairman, Subcommittee on
Communications
United States Senate
Room 227
Senate Hart Office Building
Washington, D.C. 20510-6130

Re: Emerging Telecommunications Technologies
Act of 1990 -- S.2904

Dear Mr. Chairman:

The Utilities Telecommunications Council ("UTC") is pleased to submit the following comments on the "Emerging Telecommunications Technologies Act of 1990" (S.2904). UTC is the national representative on telecommunications matters for over 2,100 of the nation's electric, gas, water and steam utilities ("Utilities"). UTC's members range in size from large combination electric-gas-water-steam systems serving millions of consumers, to small rural electric cooperatives and water districts serving only a few thousand residents.

While UTC supports the intent of S.2904 and the companion bill, H.R.2965, to reallocate unused Federal government radio spectrum to the private sector, UTC is concerned that the bill's emphasis on reliance by users on "commercial carriers" and its emphasis on earmarking spectrum for "commercial uses" could have a serious adverse impact on the reliability of the telecommunications systems of Federal power entities such as the Tennessee Valley Authority (TVA), the Bonneville Power Administration (BPA) and the Western Area Power Administration (WAPA). In turn, this could impact the reliability of their electric service. If these concepts were applied to non-Federal government users by the Federal Communications Commission (FCC), it could have a similar adverse impact on the reliability of service of the 2100 utilities which are members of UTC.

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Industry Concerns

UTC's concerns are two fold:

(1) The emphasis on reliance by users on "commercial carriers" and "vendors" could be misinterpreted as a policy determination that entities having communications requirements should look to common carriers or other commercial vendors to satisfy those requirements. Such a policy, whether express or implied, would represent a complete reversal of long-standing communications policy fostering the development and use of utility-owned and operated private land mobile and microwave communications systems and could impact utility telecommunications reliability.

(2) The emphasis on making spectrum available for new "commercial" operations, such as Personnel Communications Networks (PCN), could be at the expense of existing utility users which depend upon their private radio and microwave systems to provide reliable utility service to the American public.

Freedom To Choose Private Systems Is Critical To Reliability.

Section 2 of the bill includes a finding that government frequencies are being assigned for services "that could be obtained more efficiently from commercial carriers or other vendors". Likewise, Section 4(c)(1) of the bill provides that, in determining whether a government frequency will not be required for present or future government needs, the Secretary of Commerce shall:

(A) consider whether the frequency is used to provide a communications service that is or could be available from a commercial carrier or other vendor; [and]

(B) seek to promote --
(i) the maximum practicable reliance on commercially available substitutes; ...

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The bill would thus require Federal government users to demonstrate that their telecommunications needs could not be met by "commercial carriers or other vendors" as a condition of retaining their proprietary radio or microwave systems. UTC is very troubled by the concept of forcing users, such as TVA, BPA and WAPA, to rely on the services of commercial communications providers. While the reallocation formulas of S.2904 impose this requirement only with respect to Federal government users, this policy, if established as a precedent in the Federal sector, could just as easily be applied by analogy to frequency allocations or licensing decisions by the FCC in the private sector.

Utilities (both Federal and non-Federal) depend on private land mobile and microwave radio systems, because they provide highly reliable telecommunication systems under the utilities complete control. Utilities, either Federal or private sector, should not be forced to rely on common carriers or other commercial vendors for their vital communications requirements. Private land mobile radio facilities are used for crew dispatch for restoration of service and for some automated distribution functions. Private microwave systems have become essential elements in the utilities' communications plans, and are used to carry voice and data services between utility control centers, headquarters, data centers, power plants, and other utility facilities.

The need by utilities for reliable, private systems has been repeatedly demonstrated. For example, in its April 1, 1985, First Report and Order in PR Docket No. 83-426, dealing with private microwave service rules, the FCC found that "Power companies demand a reliability factor of 99.995 percent ... which is higher than the level of reliability for most common carrier services."

A study by the Federal Power Commission, following the 1965 Northeast Blackout, recommended the use of private microwave facilities, and noted the importance of utilities being in "complete control" of the communications facilities which control or protect electric circuits.

In the Three-Mile Island (TMI) incident, the utility could not secure adequate common carrier services due to overload of the local telephone central office circuits. However, because the plant operator had installed a private microwave system, the utility was still able to pass critical information into and out of the nuclear plant. The TMI incident dramatically confirmed that the choice of communications technology (e.g., microwave, fiber or satellite) must be in the hands of the utility.

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Hurricane Hugo and the recent California earthquake dramatically confirmed the need for utilities to have proprietary land mobile and microwave systems free from the "traffic saturation" typically experienced on public communications networks, including cellular telephone systems, during such emergencies. In these situations, where utility crews are working round-the-clock to restore vital public services, utilities cannot "compete" with the increased volume of non-utility traffic on public communications networks. With private land mobile or microwave systems, utilities are able to dispatch crews, coordinate service restoration, and communicate with civil defense and public safety officials without delay or interruption.

With this as background, it is clear that any restriction on a utility's ability to obtain and operate private communications facilities would threaten the reliability and safe functioning of the underlying utility system. If utilities are unable to secure radio frequencies for their proprietary communications systems, they will be restricted to using whatever services might be available from the local common carrier. Even assuming the local telephone company makes available the proper mix of services, the utility will be at the mercy of the telephone company should an emergency (such as a hurricane or earthquake) disrupt the utility's leased circuits. Thus, the subcommittee should make it clear that it does not intend these provisions of the bill to degrade the reliability of utility telecommunications systems.

Spectrum For New Commercial Operation Should Not Be At Utilities Expense.

In introducing S.2904, it was noted that there is a "severe shortage of spectrum for the commercial development of the newest and most sophisticated technologies." (136 Cong. Rec. S10656, Statement of Sen. Inouye). Among the new technologies cited as requiring additional spectrum are Personal Communications Networks (PCN). Recently, the FCC released a Notice of Inquiry, in GEN Docket No. 90-314, suggesting that spectrum should be reallocated to PCN from the fixed microwave services in the 1.7-2.3 GHz band. UTC's review of the FCC's licensing records indicated that approximately 250 utility companies are licensed to use over 6,100 frequencies in this band at over 3,700 microwave stations. These are "backbone" systems providing telecommunications critical to the reliability of utility service. While UTC has no specific information on the number of stations used by the Federal utilities, such as Bonneville, TVA, or WAPA, UTC understands that these agencies also make extensive use of government spectrum in this frequency range. It is questionable if there is sufficient vacant spectrum

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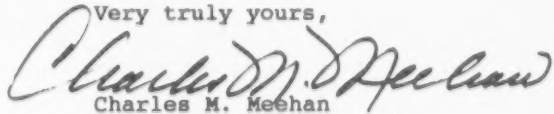
to relocate all of these critical systems. In many cases private fiber systems or satellite are not practical substitutes for private microwave. Any microwave spectrum which is available is at higher frequency ranges, with less desirable propagation characteristics. This will require, in many cases, the redesign and reconstruction of existing microwave systems at considerable cost and taking a prolonged period of time.

Recommended Action

To the extent S.2904 is intended to promote the reallocation of spectrum for new technologies such as PCN, it should be made clear that such reallocations should not be at the expense of existing Federal or private sector utility users who rely on their private microwave systems for the safe and efficient delivery of utility services to the American public. UTC therefore respectfully requests the Subcommittee to clarify that the reallocation procedures of S.2904 are not intended to indicate any preferential treatment for common carriers or other commercial communications vendors, that the spectrum needs of utilities, whether Federal or private sector, will not be compromised, that satisfactory replacement spectrum will be found for existing users and that those who benefit from such a reallocation (e.g. PCN operators) should bear the cost of relocating existing microwave users.

UTC is pleased to have the opportunity to present these comments, and would welcome any further questions you, your colleagues or staff may have on this matter.

Very truly yours,


Charles M. Meehan
Executive Director and
General Counsel

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NWPPA

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July 27, 1990

Senator Slade Gorton
 Hart Building, Room 730
 Washington, D.C. 20510

Dear Senator Gorton:

I understand that the Subcommittee on Communications of the Committee on Commerce, Science and Transportation will hold a hearing on August 2 of a bill similar to H.R. 2965, the "Emerging Telecommunications Technologies Act of 1989". This Association is concerned about some aspects of this bill, and would appreciate your inserting this letter in the record of the Committee's hearings.

The Northwest Public Power Association (NWPPA) is concerned about this matter because this Association represents 160 consumer owned electric utilities in nine western states; most of the member utilities of NWPPA obtain all or some of their wholesale power supply from BPA. Furthermore, BPA provides approximately 80 percent of the bulk power transmission capacity in Oregon, Washington, Idaho and western Montana, and is interconnected with more than 100 other electric utilities in a coordinated power grid that covers the entire western United States and Canada.

H.R. 2965 would require the Secretary of Commerce to submit a report to the President and Congress, within two years after the bill's enactment, "identifying, and recommending for reassignment," those frequencies within the electromagnetic spectrum that are located below 5 gigahertz (GHz). Within six months after receipt of the Secretary's report, the President would be required to withdraw the assignments to government stations of frequencies which the report recommends for reassignment. The President also could assign frequencies to affected government stations.

BPA utilizes the 162-174 MHz, 406-420 MHz and 1710-1850 MHz bands which the agency could be required to vacate because of the passage of H.R. 2965. These bands are used for mobile dispatch of the power system and point-to-point communications, and are vital to the operation of the power system. Requiring BPA to vacate its present bands and utilize commercial services would not be acceptable to BPA customers because the alternatives would impair reliability of service. Alternatively, requiring BPA to vacate its present bands and move to higher frequencies would result in higher costs to regional ratepayers with no increase in benefits.

The impairment of reliability would be the more serious consequences of H.R. 2965. BPA's present interconnected telecommunications network is essential for the operation of the interconnected power transmission system. Information is telemetered over the system that provides instantaneous control, protection and status of the power system.

Voice communications provided by this system also are necessary for the normal and emergency dispatch and maintenance of the system. The Western Systems Coordinating Council (WSCC), which is the western member of the National Electric Reliability Council (NERC), has established minimum reliability criteria of 99.986 percent for operational telecommunications circuits. These requirements cannot be obtained using FTS or commercial services. (NERC was established by the electric

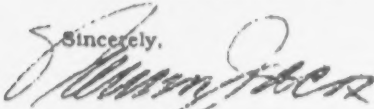
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utility industry in large part because of concerns expressed by the Congress about reliability of electric service, following the Northeast blackout of 1965.)

Requiring BPA to abandon its present frequency bans and move to higher frequencies also could be costly to the agency. We understand that the cost would be a minimum of \$25 million. An even larger cost could be incurred through loss of reliability of service. On a single major power line intertie, BPA may net \$1 million a day in revenue. Loss of this revenue because of an interruption of service over a period of time cumulatively could far exceed the cost of radio replacement.

For the above reasons, we urge that an exemption be provided for BPA and any other federal power agency that would be similarly affected by this legislation.

Sincerely,



Norman C. Jacox
General Manager

NCJ:bf

